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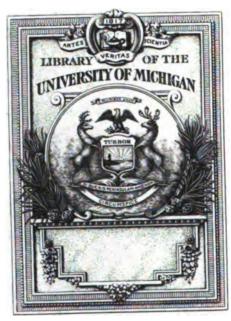
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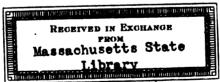
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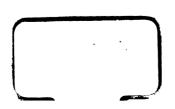
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THIRTEENTH ANNUAL REPORT

OF THE

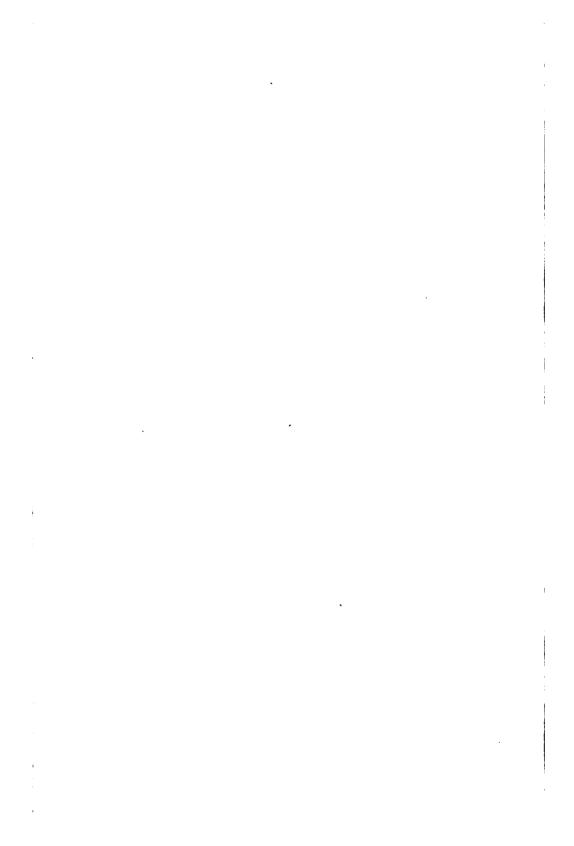
Board of Public Works

OF THE-

City of Grand Rapids, Michigan.

FOR THE FISCAL YEAR ENDING APRIL 30, 1886.

GRAND RAPIDS, MICH.: EATON, LYON & ALLEN PRINTING COMPANY. 1886.



REPORT

OF THE

Board of Public Works

TO THE

Common Council of the City of Grand Rapids,

TRANSMITTING THE REPORTS OF THE

COLLECTOR, CITY SURVEYOR

AND THE

Engineer and Inspector

OF THE WATER WORKS,

For the Fiscal Year ending April 30, 1880.

Grand Rapids, Michigan. Laton, Lyon & Allen Printing Company. 1886.





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BOARD OF PUBLIC WORKS.

GEORGE W. THAYER, PRES'T.	(Term expires May, 1888.)
D. E. EMERY,	(Term expires May, 1888.)
A. D. PLUMB,	(Term expires May, 1886.)
WILDER D. STEVENS,	(Term expires May, 1887.)
GEORGE G. BRIGGS, -	(Term expires May, 1887.)

OFFICERS.

H. A. COLLAR			City Surveyor.
FRED A. TWAMLEY, -	•	(Clerk and Collector.
THOMAS J. WILLARD,			Assistant Collector.
GEORGE E. KIRK,	First	Engineer a	at Pumping Works.
S. M. Barrows,	Second	Engineer a	at Pumping Works.
GEORGE H. BARROWS,	-		- Fireman.
ROBERT PENNELL	-		- Fireman.
John Van Amberg		- F	oreman of Repairs.
A. PER LEE.	-		Inspector.
JOHN DOYLE, -			- Watchman.



REPORT OF THE BOARD.

To the Honorable Mayor and Common Council of the City of Grand Rapids:

GENTLEMEN—The Board of Public Works have the honor to submit herewith their report for the year ending April 80, 1886, together with the report of the City Surveyor, the Collector of Water Rates, the Engineer in charge of the pumping works, and the Water Inspector.

The report of the water department, when compared with those of preceding years, exhibits a marked improvement in both gross and net earnings. For the year 1880, the gross receipts of this department were less than \$16,000, and the net earnings were barely \$5,000. For the ending April 30, 1886, the gross receipts reach within a fraction of \$35,000, showing a net income of \$18,813.47, being an increase in gross receipts over the previous year of \$6,239.11 and in net earnings of \$7,379.84.

The amount of water pumped during the year exceeds that of the preceding year only about thirty-three million gallons, increasing the pumping service about a half hour per day.

The removal of the leaky sixteen inch wood forcing main from Ottawa street and putting a twenty-four-inch iron main in its place, has been productive of good results. A saving of water has been made by removing defective wood pipe in other localities and substituting iron in its place. A material saving has resulted from an inspection of water fixtures, and from notices personally served upon water takers who ignore the necessary rules framed to govern them in the use of water. This inspection service has been inaugurated during the past year by the employment of a person for that special work. The results of this new service justify its continuance.

The total cost of repairs on iron water mains for the year amounts to \$366.91, representing about fifteen miles of pipe. The total cost of repairs on Wyckoff wood pipe for same period amounts to \$1,598.31, representing about ten miles of pipe. Notwithstanding the mileage of Wyckoff pipe is gradually being reduced by the substitution of iron, the annual cost of repairs is rapidly increasing, the cost for the past year being \$647.59 in excess of the preceding year. This rapid increase

in the cost of repairs on Wyckoff pipe plainly indicates that as occasion arises iron must be substituted in its place.

The question of a new or additional source of water supply remains an unsolved problem. The Board have made every proper effort to secure the greatly needed increase in quantity, and the much desired improvement in quality, but the necessary co-operation of a majority of the tax pavers has been withheld. The insufficiency of the present supply, if long permitted, may eventually result in a great public disaster by fire. To provide against this possibility, the Board contemplate making recommendations to be carried into effect before the draught of another summer shall overtake us. Citizens continue to petition for an extension of water mains. The Board are without means to comply with even the most meritor. ious of such requests. While the requisite means must be provided before further extensions can be made, other important reasons exist why such requests cannot at present be complied with. With our present inadequate water supply, if means were at hand, the Board do not deem it to be expedient to make further extension of water mains.

The Board take the liberty to again invite your attention to the expediency and justice of making provision for paying to the water department a reasonable compensation for water now furnished the city free. The city now have 285 fire hydrants for which water is furnished gratuitously. This important and expensive service should be recognized. Many cities pay their water department various sums ranging from \$10 to \$75 annually for each hydrant. Where the works are owned by the city, as here, it costs nothing to make the payment as suggested. Where the works are owned by a private corporation, such payments are universal. Now a large sum is annually raised by direct tax to pay interest on outstanding water bonds that the net earnings of the works, under the present system, do no provide for. This item of taxation, instead of being in the form of a subsidy to the water department, should appear as a legitimate item of expense paid to that department for benefits received. It would enable that department to provide for the payment of annual interest on its bonds and make a fair showing of its financial status, which it is now deprived of doing. The payment by the city to the water department of sixty dollars for each fire hydrant would practically cost the city nothing, but it would be an act of simple justice to that department. This recommendation has heretofore been made to your honorable body, but it has not been acted upon. It is renewed with a hope that it may receive your consideration.

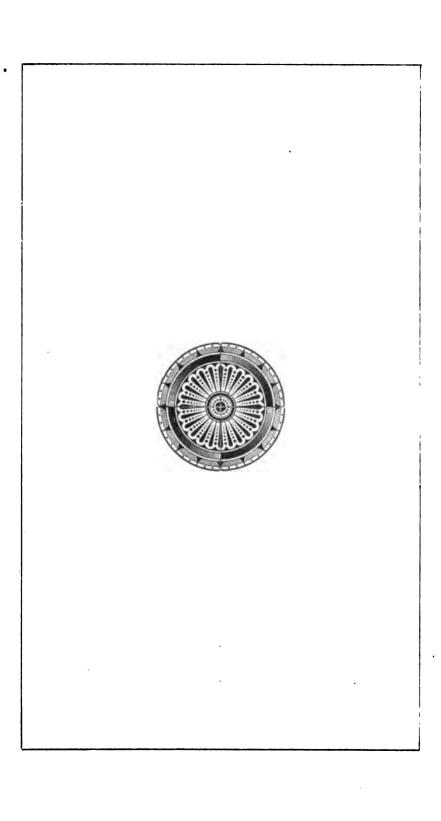
By act of the Legislature, approved June 9, 1885, it was made

the duty of the Board of Public Works to define and establish dock and building lines along the margin of Grand River, within the corporated limits of the city. This work, involving considerable labor and expense, has been fully completed. It remains for the Council to pass such an ordinance as will cause these lines to be respected, and give to the city the benefits that may be secured from the work that has been done.

The report of the City Surveyor, to which your attention is invited, gives in detail the extent and character of the public work carried on under direction of the Board during the past year, covering the establishment of street grades, the improvement of streets, the construction of sewers, bridges, and the city hall, the laying of water mains, and the establishment of dock and building lines along the margin of the river.

Respectfully submitted,
GEO. W. THAYER,
WILDER D. STEVENS,
A. D. PLUMB,
GEO. G. BRIGGS,
D. E. EMERY.

Board of Public Works.



COLLECTOR'S REPORT.

Office of Board of Public Works, (Grand Rapids, May 1, 1886.

To the Honorable Board of Public Works:

GENTLEMEN:—I respectfully submit to your honorable body the following report, for the year ending April 80, 1886:

The number of services on the 1st of May, 1885, for which permits were issued, were	\$ 1,	892 27 87
Total	\$ 1,	456
Number of services put in the past year, for which permits were issued		181 8
Total number of connections on May 1, 1886 Number of services now cut off	•	595 142
Number of services now open	1,	458°
The receipts at this office for the year, have been as followed	ows:	
From water rates, fines, etc	\$84,148	24
From water permits	767	25
Total income from Water Works	\$84,915	49
From sewer permits	94	50
From contractor's forfeit on bid		
Total receipts for the year	\$35,109	99
Cash on hand May 1, 1885	861	71
	\$85,471	70

2

as follows:		
To the credit of Water Works income fund	-	
To credit of first district sewer fund	76	
To credit of second district sewer fund		00
To credit of contingent fund	100	0€
Total deposite during the year	\$34,607	68
Cash on hand to balance	864	02
	\$8 5,471	70
Receipts from May 1, 1874, the commencement of coll May 1, 1885:	lections	, to
From water rates	166,151	00
From water permits	7,806	28
From sewer permits	1,051	50
From various sources, (as per past reports)	2,982	42
Total	177,991	15
Receipts for the past year	35,109	99
Total receipts to date	218,101	14
Deposits made from May 1, 1884, to May 1, 1885:		
Fo the credit of water works income fund	174,588	08
To the credit water works fund	1,198	40
Fo the credit of first district sewer fund	648	00
To the credit of second district sewer fund	214	50
To the credit of various funds, (as per past reports)	1,040	51
Total	177,629	44
Deposits made the past year	34,607	65
Cash on hand to balance	864	02

STATEMENT OF EXPENDITURES. .

May 1, 1885, to May 1, 1886.

CONSTRUCTION OF WATER WORKS.

CONSTRUCTION OF WAIRE WORKS.		
1.—Pipe System.		
Relaying and extension of mains	\$ 16,992	03
2.—Additional Supply.		
Services of engineer, etc	2,623	75
3.—Pumping Machinery.		•
Damper Regulator	136	25
4.—METERS.		
New meters and setting	706	31
Total paid on construction	20,458	3 4
Paid previous to May 1, 1885		05
Cost of works to date	\$485 066	39

MAINTENANCE AND OPERATION OF WATER WORKS.

1.—Pumping.	•	
Salary, Engineer	\$1,200	00
Salary, Assistant Engineer	780	00
Salary, First Fireman	600	00
Salary, Second Fireman	590	00
Fuel	5,279	39
Repairs to Engine House	33	00
Supplies, (oil, packing, etc.)	436	15
	\$8,918	 54
2.—Office and Collecting.		
One-fourth salary Clerk and Collector	249	96
Salary Assistant Collector	500	00
Stamps, Printing, etc	131	75
·	\$ 881	71

Salary, Foreman of Repairs	12 ANNUAL REPORT OF THE		
Salary Inspector of Water Waste, 9 months 478 0	8.—Repairs and Inspection.		
1.—IRON PIPE. \$ 332 85	Salary, Foreman of Repairs	999	96
Labor \$ 382 85 Material 34 06 2.—WYCKOFF PIPE. Labor \$ 1,216 30 Material 382 01	Salary, Inspector of Water Waste, 9 months	478	00
Material 34 06 ————————————————————————————————————	1Iron Pipe.		
2.—Wyckoff Pipe. \$ 1,216 30 Material 382 01	Labor \$ 832 85		
2.—Wyckoff Pipe:	Material 34 06		
Labor	*	366	91
Material 382 01	2.—Wyckoff Pipe.		
1,598 8	Labor \$ 1,216 30		
S.—Pump Logs. 121 5	Material 382 01		
Labor		1,598	81
A.—Valves 188 68 Material 62 184 2 5.—Hydrants 103 25 \$398 6 6.—Meters 696 66 Material 86 59 783 2 7.—Reservoir 39 5 5.—Settling Basin 50 0 9.—Supply Creeks \$35 75 Salary, Watchman 230 00 265 7 10.—Service Connections \$185 56 \$185 56 \$35 75 \$35 7	8.—Pump Logs.		
Labor	Labor	121	50
Labor	A Varyon		
Material 62			
Salary, Watchman 184 2 185 56 185 56 185 56 185 56 185 56 185 56 185 56 185 56 182 57 185 56 182 57 185 56 182 57 185 56 182 57 185 56 182 57 185 56 182 57 185 56 182 57 185 56 182 57 185 56 182 57 185 56 182 57 185 56 185 56 182 57 185 56 185 56 182 57 185 56 185 56 182 57 185 56 1			
5.—Hydrants. Labor \$295 37 Material 108 25		134	25
Labor \$295 37 Material 108 25	5.—Hydrants.		
#398 6 6.—Meters. Labor			
6.—Meters. Labor \$ 696 66 Material \$6 59	•		
Labor \$ 696 66 Material 86 59 783 2 7.—Reservoir. Labor 39 5 8.—Settling Basin. Labor 50 0 9.—Supply Creeks. Labor \$ 35 75 Salary, Watchman 230 00 — 265 7 10.—Service Connections. Labor \$ 185 56		\$398	62
Material 86 59 7.—Reservoir. 783 2 7.—Reservoir. 39 5 8.—Settling Basin. 50 0 9.—Supply Creeks. 50 0 Labor \$ 35 75 Salary, Watchman 230 00 — 265 7 10.—Service Connections. Labor \$ 185 56	6.—Meters.		
7.—Reservoir. 10.—Service Connections. 7.—Reservoir. 8.—Settling Basin. 8.—Supply Creeks. \$ 35 75 \$ 35 75 \$ 280 00 265 7	Labor \$ 696 66		
7.—Reservoir. \$\frac{1}{2}\$ 50 0 \$\frac{1}{2}\$ 8.—Settling Basin. \$\frac{1}{2}\$ 50 0 \$\frac{1}{2}\$ 9.—Supply Creeks. \$\frac{1}{2}\$ 35 75 \$\frac{1}{2}\$ 365 7 \$\frac{1}{2}\$ 10.—Service Connections. \$\frac{1}{2}\$ 185 56	Material 86 59		
Salary, Watchman Service Connections S	Arrest Militaria gardenga	783	25
8.—SETTLING BASIN. 50 0 9.—SUPPLY CREEKS. Labor\$ 35 75 Salary, Watchman	7.—Reservoir.		
Supply Creeks \$ 35 75	Labor	39	50
Supply Creeks \$ 35 75	8.—SETTLING BASIN.		
9.—SUPPLY CREEKS. Labor		50	08
Labor			
Salary, Watchman			
265 7 10.—Service Connections. Labor			
10.—Service Connections. Labor	Salary, watchman	265	75
Labor \$ 185 56	10. Spring Connections	200	
•			
DI 6001 1611	•		
516 3	viavoitai	51 0	99

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11.—Miscellaneous.			
Tools \$ 3	350 24		
Blowing off	9 75		
Barn	86 91		
Shop and store house	32 07		
Telephone at Foreman's residence	20 29		
		549	26
ti.	•	6,801	77
RECAPITULATION.		0.010	- 1
Pumping		8,918	
Office and Collecting		881	
Superintendence and Repairs		6,801	77
Total paid for maintenance and operation		16,102	02
Income for the year		84,915	49
Cost of maintenance and operation			
Excess of receipts over expenditures	{	18,818	47
METERS.			
Thirty-nine old meters have been exchanged for	same r	umber	of
new meters, and 11 others added during the year, the t		mber n	bw
new meters, and 11 others added during the year, the t	otal nu		
·	otal nu		
new meters, and 11 others added during the year, the to owned by the city being 446, of which there are set an the following manufacturers:	otal nu d in op	eration	
new meters, and 11 others added during the year, the to owned by the city being 446, of which there are set an	otal nu d in op	eration	of
new meters, and 11 others added during the year, the towned by the city being 446, of which there are set and the following manufacturers: Ball & Fitts Rotary	otal nu d in op	eration	of 141
new meters, and 11 others added during the year, the towned by the city being 446, of which there are set and the following manufacturers: Ball & Fitts Rotary	otal nu d in op	eration	of 141 66
new meters, and 11 others added during the year, the to owned by the city being 446, of which there are set an the following manufacturers: Ball & Fitts Rotary	otal nu	eration	01 141 66 78
new meters, and 11 others added during the year, the toowned by the city being 446, of which there are set and the following manufacturers: Ball & Fitts Rotary	otal nu	eration	01 41 66 79 48
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new meters, and 11 others added during the year, the towned by the city being 446, of which there are set and the following manufacturers: Ball & Fitts Rotary	otal nu	eration	01 141 66 79 48 30
new meters, and 11 others added during the year, the towned by the city being 446, of which there are set and the following manufacturers: Ball & Fitts Rotary	otal nu	eration	01 141 66 79 48 30 364
new meters, and 11 others added during the year, the towned by the city being 446, of which there are set and the following manufacturers: Ball & Fitts Rotary	otal nu	eration	01 141 66 79 48 30 364
new meters, and 11 others added during the year, the towned by the city being 446, of which there are set and the following manufacturers: Ball & Fitts Rotary	otal nu	eration	01 141 66 79 48 30 364 25 4

LEAKS ON DISTRIBUTION MAINS.

The following table shows the number, cause and location of the various leaks on the mains during the year:

NAME OF STREET.	KIND OF PIPE.	LMOH.	Month.	DAY.	CAUSE.
Ottawa	Wyckoff	16	May	4	Joint
Summer	Wyckoff	8	May	6	Joint
Scribner	Wyckoff	8	Мау	8	Joint
South Division	Wyckoff	12	May	18	Joint
Louis	Wyckoff	4	Мау	21	Joint
North Canal	Iron	6	May	25	Joint
Ottawa	Wyckoff	16	June	1	Joint
Масоп	Wyckoff	16	June	8	Joint
Lyon :	Wyckoff	14	June		Joint
Fountain	Pump Log.	6	June	22	Split
West Bridge	Wyckoff	12	June	28	Joint
West Bridge	Wyckoff	12	Jane	25	Joint
Broadway	Wyckoff	12	June	26	Joint
Mason	Iron	16	June	29	Joint
West Fulton	lron	12	June	30	Joint
Allen	Wyckoff	8	July	2	Joint
Mason	Wyckoff	16	July	6	Joint
Broadway	Wyckoff	12	July	28	Joint
Coldbrook	Iron	20	July	24	Joint
Ottawa	Wyckoff	12	July	27	Joint
Kent	Wyckoff	6	July	28	Joint
Scribner	Wyckoff	12	July	29	Joint
Scribner	Wyckoff	8	July	30	Joint
Coldbrook	Wyckoff	16	August	8	Joint
Ottawa	Wyckoff	6	August	10	Joint
Bronson	Wyckoff	14	August	12	Joint
Waterloo	Wyckoff	8	August	24	Joint
South Division	Wyckoff	12	August	27	Joint
South Division	Iron	12	August	27	Joint
Ottawa	Wyckoff	16	August	29	Joint

LEAKS ON DISTRIBUTION MAINS-CONTINUED.

NAME OF STREET.	KIND OF PIPE.	INCH.	Monte.	DAX.	CAUSE.
Ottawa	Wyckoff	12	August	31	Joint
South Division	Wyckoff	12	Septemb'r	4	Joint
Ottawa	Wyckoff	16	Septemb'r	8	Joint
Ottawa	Wyckoff	16	Septemb'r	10	Joint
Ottawa	Iron	12	Septemb'r	11	Joint
Ottawa	Wyckoff	16	Septemb'r	14	Joint
North Canal	Wyckoff	16	Septemb'r	16	Joint
North Canal	Wyckoff	12	Septemb'r	28	Joint
Ottawa	Wyckoff	16	Septemb'r	29	Joint
South Division	Wyckoff	12	October	6	Joint
Waterloo .:	Wyckoff	8	October	8	Split
Scribner	Wyckoff	8	October	9.	Joint
Scribner	Wyckoff	8	October	10	Joint
Broadway	Wyckoff	12	October	13	Joint
Scribner	Wyckoff	្ន	October	16	Joint
South Division	Wyckoff	12	October	27	Joint
Righth	Wyckoff	12	October	29	Split
Bronson	Pump Log .	6	October	29	Split
Broadway	Wyckoff	12	October	81	Joint
Waterloo	Wyckoff	8	Novemb'r	2	Joint
North Canal	Wyckoff	12	Novemb'r	8	Joint
Broadway	. Wyckoff	16	Novemb'r	10	Joint
Broadway	Wyckoff	12	Novemb'r	12	Joint
Clinton	Wyckoff	6	Decemb'r.	7	Joint
Jefferson	. Wyckoff	4	Decemb'r.	8	Joint
Campau	Wyckoff	4	Decemb'r.	22	Joint
South Division	Wyckoff	12	Decemb'r.	28	Joint
Fountain	Pump Log	6	January	1	Split.
Lyon	. Wyckoff	14	January	6	Joint
Mason	Wyckoff	12	January	11	Joint
Coit Avenue	Wyckoff	14	January	15	Joint
East Bridge	. Wyckoff	12	January	25	Joint.

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LEAKS ON DISTRIBUTION MAINS-CONTINUED.

NAME OF STREET.	KIND OF PIPE.	INCH.	Month.	DAX.	CAUBE.
North Canal	. Iron	20	February .	1	Joint
Fountain	. Pump Log .	6	February .	15	Split
Fountain	. Pump Log .	6	February .	21	Split
Barclay	. Wyckoff	14	February .	24	Joint
Coldbrook	. Iron	20	March	1	Joint
Coldbrook	. Iron	20	March	5	Joint
Coldbrook	. Iron	20	March	8	Joint
Coldbrook	. Iron	20	March	11	Joint
Louis	. Wyckoff	14	March	26	Joint
South Division	. Wyckoff	12	March	29	Joint
Broadway	. Wyckoff	12	April	7	Joint
Fountain	Pump Log.	6	April	8	Split
South Division	. Wyckoff	12	April	18	Joint
Broadway	. Wyckoff	12	April	14	Joint
Soribner	. Wyckoff	6	April	15	Joint
Coldbrook	. Iron	20	April	20	Joint
Coldbrook	. Iron	20	April	22	Joint
Coldbrook	Iron	20	April	26	Joint
Waterloo	. Wyckoff	8	April	29	Joint

Total number of leaks, 81.

The total length of water mains now laid, is 27.3 miles.

Number of hydrants, 285.

Number of valves, 184.

Respectfully submitted,

FRED A. TWAMLEY,

Clerk and Collector.

ENGINEER'S REPORT.

To the Honorable Board of Public Works of the City of Grand Rapids:

GENTLEMEN:—I have the honor to submit my annual report of the work done by the pumping engines for the year ending April 30, 1886.

The increase in the consumption of water this year has not been so great as in former years, but at times the demand far exceeded our pumping capacity, as we were able to run only one engine, but since the large force main has been laid, the difficulty has been obviated, and we are able to run both engines with satisfactory results:

The greatest amount of water pumped in one day,	
Feb. 5, was	3,481,400 gal.
The least amount of water pumped in one day,	
May 80, was	1,457,500 gal.
The average daily consumption for the year has	•
been	46,080 93-100 gal
Against an average the previous year of	1,937,994 gal.
The total cost to pump one million gallons of water	
into reservoir—elevation 156 feet	\$ 12.44 20-100
The total cost of fuel to raise one million gallons	
of water into reservoir	\$ 7.43 \$ 1.100

The following table shows the number of days run for each month,

the number of revolutions made, gallons of water pumped, amount of wood burned, and cost of the same:

MONTH.	DAYS BUN.	TIME BUN.	NO. OF BEVOLUTIONS.	GALLONS OF WATER PUMPED.	CORDS OF WOOD.	COST OF
May	31	H. M. 545 50	681,382	68,188,200	279	\$5 01 00
Jane	80	588 45	583,115	58,311,500	220	440 00
July	81	606 30	752,519	75,251,900	298	557 75
August	31	483 25	605,032	60,508,200	247	494 00
September	30	472 85	595,175	59,517,500	248	487 25
October	31	471 00	593,707	59,870,700	255	475 00
November	30	455 15	578,477	57,847,700	215	398 25
December	31	538 55	638,960	68,896,000	279%	317 58
January	31	576 05	633,008	63,300,800	297	491 00
February	28	589 30	612 342	61,284,200	273	518 70
March:	81	509 10	600,820	60,082,000	28814	470 10
April	3 0	515 3 0	587,276	53,727,600	210	360 00
Total	365	6,412 30	7,406,813	740,681,300	3060	\$5,505 58

The running expenses for the year have been:		
For Repairs	\$ 82	19
For Supplies, Packing, and Steam Damper, etc	457	87
For Wood	5,505	58
For Salaries	3,170	00

Respectfully submitted,

GEORGE E. KIRK,

Engineer.

\$9,215 64

WATER INSPECTOR'S REPORT.

GRAND RAPIDS, May 1, 1896.

1960

To the Honorable Board of Public Works:

GENTLEMEN:-I respectfully submit the following report, for the year ending April 30th, 1886: Total number of premises supplied with water, (not metered).... Total number of fixtures, 4.111, as follows: Baths 202 Closets 1001 Wash Basins.... 200 Sinks 712 Urinals..... Fountains Hydrants 1417 Hose Attachments.... 285 Miscellaneous..... 248 All of which have been carefully inspected with the following result: Number of premises inspected..... 1544 Leaks discovered..... 317 Notices served for violation of rules..... 387 Special notices.... 44

Number of inspections.....

The following table shows the number, kind and location of fixtures not metered:

	<u>.</u>	:TB.	Ваяцив.	aî.	ALS.	IMB.	INTE.	ATTACE'S.	0	nd F Bets.	ANR'B.
WARDS.	BATES	CLOSETS.	WASH BA	BINES.	URINALS.	FOUNTAINS.	HYDRANTS.	Hose AT	HOPPER.	PAN.	MISORILANE'S
First	6	46	6	59	2	0	98	12	84	11	26
Second	87	256	89	180	4	8	225	42	98	160	89
Third	108	416	92	246	5	1	462	122	166	268	91
Fourth & Fifth.	17	137	21	136	8	1	394	39	78	64	28
Sixth & Seventh	2	40	5	41	41 9 0 107 13 28	13	13	17	17	22	
Eighth	17	60	17	67	0	0	113	24	84	26	14
Sch'l & En. ho's	5	16	20	88	18	0	23	0		not æd.	28
Total	202	1001	200	712	41	5	1417	285	10	01	248

The metered service has also had a careful examination.

Respectfully submitted,

A. PER LEE,
Water Inspector.

CITY SURVEYOR'S REPORT.

CITY SURVEYOR'S OFFICE, GRAND RAPIDS, MICH., May 1, 1886.

To the Honorable Board of Public Works:

GENTLEMEN—I have the honor to herewith submit my annual report of the public improvements brought to completion, together with a statement of those placed under contract during the year ending April 30, 1886.

STREETS.

The following table shows the streets and alleys for which grade lines have been approved and adopted, and the length and terminal points of such grade lines.

Approximate estimates of cost have been prepared and certified to the Common Council for improving most of the streets named in the table, and for other work, to the number of sixty-one: Table of streets for which grade lines have been approved, giving length in feet of line established:

STREET.	FROM	то	Length in Feet.
North	Cedar	Sweet	3,900
Finney	Wealthy	Waterloo	1,225
Fourth	Front	Stocking	2,927
Benson	E. Bridge	D., G. H. & M. Ry	719
Center	Fifth	Hall	2,578
Ney	Waterloo	Wealthy	562
Straight	Butterworth	L. S. & M. S. Ry	650
W. Bridge	Gold	W. City limits	8,318
John	Barclay	N. Lafayette	438
Lawn Court	S. Lafayette	Madison	688
McReynolds	Fourth	W. Leonard	3,637
Henrietta	Madison	Page	588
S. Waterloo	E. Fulton	Bartlett	2,190
Green	Jefferson	8. Division	865
8. Spring	E. Fulton	Wealthy	2,578
N. Waterloo,	Monroe	Ferry	5,940
Stocking	W. Bridge	Seventh	8,072
Livingston	Fairbanks	Reservoir	796
Bliven Court	Second	156 feet north of First	568
Hastings	Canal	Ottawa	506
Oakes	8. Division	Jefferson	918
Pearl	Campau	East end of bridge	210
N. Ionia	Lyon	Monroe	965
Ransom	E. Bridge	Crescent	524
Fremont	W. Bridge	Springfield	1,988
Muskegon	Fifth	W. Leonard	3,226
Crosby	N. Front	Alpine	8,328
Sibley	W. Division	Straight	1,258
S. Lafayette	Fifth	Highland	1,815

Table of alleys for which grade lines have been approved, giving length in feet of lines established:

ALLEYS 1	BETWEEN	FROM	то	Length in Feet.
Court	Mt. Vernon	Shawmut	W. Fulton	902
lonia	Almy	E. Fulton	Island	302
S. Division	8. Spring	Goodrich	Wealthy	278
E. Bridge	Crescent	N. Lafayette	N. Prospect	965
S. Division	8. Spring	E. Fulton	Island	283
8. Ionia	S. Spring	E. Fulton	Island	297

The street improvements completed during the year are shown by the following table, which also shows the kind of improvement and the cost thereof:

STREET IMPROVEMENTS COMPLETED DURING THE YEAR ENDING APRIL 30, 1886.

NAME OF STREET.	FROM	To	KIND OF IMPROVEMENT.	Longth in Feet.	Longth Contract Bet, In- in Feet. Price. tals.	ciden-	Total Cost.	Per	CONTRACTOR.
W. Bridge-st	Broadway-st.		Stocking-st Graded and paved with wood & stone	1,070	\$3,790 00 \$150 00	\$150 00		8 8 669	\$3,940 00 8 88 I. B. Mathewson
N. Union-st	E. Bridge-et	D. & M. R. R.	Graded	868	552 00	08 00	00 089	2	B. Livingston
Chatham-et	W.Division-st	Marion-st	W.Division-st Marion-st Graded and graveled	3,230	5,188 00	142 00	5,880 00	% ∞	L. Schneider
W. Fulton-st	Shepard-et		City line Graded and graveled	1,359	8,700 00	130 00	6,830 00		4 96 J. Collins
Cherry-st		Lagrave-et	Division-et Lagrave-et Graded, graveled and gutters paved.	596	1,330 00	100 00	1,480 00		2 40 A. Rens
Third-ave	S. Ionia-et		Grandville-av Graded, graveled and gutters paved.	1,945	3,897 00	183 00	8,5H0 00		1 88 Kloote & DeBruin
Logan-st	S. Lafayette-st	E. College-ave	S. Lafayette-st &. College-ave Graded, graveled and gutters paved.	1,310	1,675 00	115 00	1,790 00		Turner & Crowley
James-st	Wealthy-ave	Sherman-at	Wealthy-ave Sherman at Graded, graveled and gutters paved.	1,249	1,980 70	119 30	2,100 00	- 88	Turner & Crowley
Second-st		Lincoln-st	Michigan-et Lincoln-et Graded and graveled	2,204	1,642 00	78 00	1,720 00	20	C. Prange
Alley blks, 28 and 28 Converse addition.	Shawmut-ave.	W. Fulton-st.	W. Fulton-st. Graded	2005	117 00	83 00	150 00	17	Stan & Pop
Alabama-st	W. Bridge-et.	Third-st	Graded and graveled	1,096	2,750 00	70 00	2,820 00	2 57	
Lawn Court	S. Lafayette-st		Madison-ave. Graded, graveled and gutters paved.	686	998 84	101 18	1,100 00	8	
Kent-st		Hastings-st	Bronson-et Hastings-et Graded and paved with wood & stone	1,125	3,929 00	131 00	00 090'+		8 61 3 Martin &
Alley between Almy and Ionia streets		Fulton-et Island-et	Graded and paved with cedar blocks	305	320 00	20 00	90 00		Martin &
John-st		N.Lafayette-et	Barclay-st N.Lafayette-st Grade, grav'l, gut'rs pav'd, stone curbs	438	1,019 24	80 76	1,100 00	2 51	А. Вере
Finney-et		S. Waterloo-et	Wealthy.ave S. Waterloo-et Grade, gravel and gutters paved	1,225	2,945 00	105 00	8,050 00	2 49	A. Rene

STREET IMPROVEMENTS UNDER CONTRACT BUT NOT COMPLETED, APRIL 30, 1896, ARE SHOWN BY THE FOLLOWING TABLE:

NAME OF STREET.	FROM	TO	KIND OF IMPROVEMENT.	Contract Price.	Est. In- ciden- tals.	Contract Est. In- Price. ciden- tals. Amount.	CONTRACTOR.
Alley, block 10, Bostwick & Co. }	Cherry	Марје	Alley, block 10, Bustwick & Co. 100 00 A. Bens Graded and graveled	162 04	27.98	8 190 00	A. Rens
Sixth	N. Front	Stocking	Sixth	4,500 00	300 00	₹,800 00	B. Livingston
E. Bridge Canal Clancy	Canal	Clancy	Graded, graveled, paved with wood 10,479 00 121 00 11,000 00 Lamoreaux & Martin	10,479 00	321 00	11,000 00	Lamoresux & Martin.
E. Bridge	С]мпоу	E. City line	E. Bridge Chancy E. City line Graded, graveled, gutters paved	6,660 00	00 077	7,100 00	6,660 00 440 00 7,100 00 R. Pickett
Ottawn	K. Bridge	Coldbrook	K. Bridge Coldbrook Graded, graveled, gutters paved 6,333 00	6,833 00	287 00	00 009'9	6,600 00 C. Prange
S. Waterloo		Finney	E. Falton Finney Graded, graveled, gutters paved	3,439 00	121 00		8,560 00 Lamoreaux & Martin
Adams		Wallen	S. Division Wallen Graded, graveled, gutters paved		150 00	3,000 00	2,850 00 150 0J 3,000 00 L. B. Mathewson
Fremout		Fourth	W. Bridge Fourth Graded and graveled		100 00	1,100 00	1,000 00 100 00 1,100 00 J. McDermott
Louis		Grand River	E. Falton Grand River Graded, paved with wood and stone	2,050 00	230 00		5,290 00 I. B. Mathewson
8 Spring		Wealthy-ave	E. Fulton Wealthy-ave Graded, graveled, gutters paved		254 254 254 254	00 090'9	5,806 00 254 00 6,060 00 A. Bens
Вателя	E. Bridge	Fountain	E. Bridge Fountain Graded, graveled, gutters paved 3,230 00 210 00 3,460 00 J. Collins	3,250 00	210 00	3,460 00	J. Collins

SEWERS. The system of sewerage was extended about the usual amount during the past season. But little in the line of trunk sewerage was constructed, nearly all being classed as lateral work. The following table shows where, and to what lengths, sewers were laid, together with the cost thereof:

NAME OF STREET.	LOCATION.	SIZE AND KIND.	МАИ- НОГЕЗ. НОГЕЗ.	LENGIH IN FEET.	CON- TRACT PRICE.	DEGLET TZGI- MVLED ESLI-	TOIAL Cosr.	CON- TRACT.IR.
Madison avenue	From 130 feet south of Cherry street south to	9 inch glazed pipe	61	90,	98 992 00	₩ 85 00	8 450 00	J. Collins
Alley block 17, Con-	From 25 feet north of Shawmut ave north 200 ft 9 inch glazed pipe	9 inch glazed pipe		9	98 98	ತ ನ	90 08	J. Collins
sonard street	West Leonard street. From 35 feet weet of G. R. & I. R. R. weet to (9 in glazed pipe) \$2233 brick			350 SE C	1,876 95	8	1,800 00	A. Rens
eonard street	West Leonard street From the west line of Elizabeth street to 18124 brick		23	86 67 67 67 67 67 67 67 67 67 67 67 67 67	645 00	255 00	00 006	900 00 L.Schneider
Lyon street	From west line of north Lafayette to west } line (ampbell place	{ 15 in gl'z'd pipe } { 12 in gl'z'd pipe } { 9 in glazed pipe }	oc	\$ \$ \$ £	1,622 26	297 64	1,920 00	А. Верв
First Avenue	From 160 feet west of South Division street \ (12 ingl'z'd pipe \) west to sewer in Bachanan street	12 in gl'z'd pipe {		\$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$		725 60 125 00	870 00	870 00 J. Collins
Second Avenue	From west line of Scribner street west to bewer in Broadway street	9 in glaz'd pipe	3 1	009	810 00	96	370 00	370 00 A. Kens
West Bridge	From east line of Alabama street to east (16x24 brick) line Gold street			\$30 \$30 \$30 \$	} \$88 \ 1,394 00		1.500 00	106 00 1.500 00 Kloote & DeBruin
Alley block %, Con- verse and Tolford's addition	From north line of Watson street to sewer in 9 inch glazed pipe 3	9 inch glazed pipe	20	181	390 00	20 00	440 00	440 00 J. McDer-
Alley block 12, Con- verse and Tolford's addition	From north line Watson street north to south) line West Fulton street, thence earerly on a curve to center of West Fulton street 20 feet seart of east line of Alley, thence east to east line of West Broadway street.	9 inch glazed pipe	: s	597	8 17	00 61	490 00	490 00 (A. Wiss-

1886-Continued.
8
APRIL
ENDING
YEAR
THE
DURING
COMPLETED
SEWERS

80	SEWERS COMPLETED DURING THE YEAR ENDING APRIL 80, 1886—Continued.	YEAR ENDING	A	RIE	8	1886-0	ontinu	ð.	
NAME OF STREET.	LOCATION.	MAN- HOLZE, MAN- HOLZE, HOLZE, MAN- HOLZE, HOLZE, MAN- HOLZE, MAN- HOLZE, MAN- HOLZE, MAN- HOLZE, HOLZE, MAN- HOLZE, MAN- HOLZE, MAN- HOLZE, MAN- HOLZE, HOLZE, MAN- HOLZE, MAN- HOLZE, MAN- HOLZE, HOLZE,	MAN- HOLES.	1 -	LENGTH IN FEET.	CON- TRACT PRIOE.	KSTI- MATED INGI- DENT/1.8.	TOTAL Cost.	CON-
Third avenue	From Grandville uvenue east to sewer in { 12ingl's'd pipe } Buchanan street Pub. Pu	{ 12ingl'z'd pipe } { 9 inglaz'd pipe }	10	**	250 250 250 250	8 708 00	\$122 00	947 } & 708 00 \$122 00 \$ 890 00	L.Schneider
Stocking street	From south line of Third street south to \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	9 in glazed pipe 12in gl'z'd pipe	•	~	₹8 ₹8	1,061 00	189 00	1,250 00	A. Wise- menn
Quarry Street	From 25 feet south of the north line of the \{Case addition south to sewer in Eleventh St. \}	9 inch glazed pipe	_		5	140 00	96 92	190 00	А. Верв
Alley blocks 28 and 28, Converse add'n 5	From 25 feet south of Shawmut avenue south } to sewer in West Fulton street	9 mch glazed pipe	67	<u>-</u>	ឌ	380 00	110 00	200 00	Kloote & DeBrain
Logan street	From west line of College svenue to east line	9 in glazed pipe (•	<u>~</u>	{ 1014} { 296}	00 760	106 00	00 008	J. Collins
Alley block 12, Ken- } dall's addition	Alley block 12, Ken- From 240 feet north of Lyon street south to dall's addition sewer in Lyon street	9 inch glazed pipe		- <u>:</u> -	279	118 00	47 00	160 00	L.Schneider
Gold street	From center Shawmut avenue north to sewer in Sibley street	9 inch glazed pipe			342	169 00	91 00	230 00	L.Schneider
East Bridge Street	From 15 feet west of the east line of Clinton street east to the west line of College avenue 5	(16 inch brick) 15 ingl'z'd pipe 12 ingl'z'd pipe 9 in glazed pipe)	<u> </u>	===	25 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	2,800 00 400 00	00 00#	8,260 00	J. Kloote
		- 11 -	- !	-			,		

BOARD	OF	PUBLIC	WORKS.
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The sewerage system as now constructed is of the	material and
lengths as follows:	
Brick sewers	16.253 miles
era a a	

Brick sewers		
Glazed pipe sewers	17.904	**
Cement pipe sewers	.480	"
Wood sewers	1.853	"
Iron pipe in river	.160	**
Total	86.650	miles



BRIDGES.

FULTON STREET BRIDGE, APPROACHES, ETC.

The bridge contracted for with the Massillon Bridge Company, of Massillon, Ohio, was completed and opened for public use, and accepted by the Board, in July of last year.

The contract price was \$20,948.00.

The contractors are deserving of the highest commendation for the superior character of the details of construction, and for the excellence of the workmanship throughout the bridge.

The approaches were completed soon after the bridge was accepted. The contract price was \$8,437.00. The hand laid rip-rap protection to the embankment, which was done by the square yard, added to the cost of the work the sum of \$1,149.00, making the total cost of the approaches \$9,586.00.

As an item of cost to the tax-payers, but not work under the direction of the Board, I will include the cost of the right of way for the approaches to the bridge.

The street was opened and extended from Waterloo Street west to the river, by condemnation of private property for street purposes in the Superior Court. The award of the jury was \$9,806.00.

The entire cost has been as follows:

Right of way	\$ 9,806	00
Bridge Masonry		
Grading Approaches	9,586	00
Bridge	20,948	00

PEARL STREET BRIDGE-MASONRY AND BRIDGE.

The piers supporting the old wooden bridge at Pearl Street, and the bridge itself, have been in an unsafe condition for a long time, making its further use by the public extremely hazardous. At a meeting of the Common Council, held June 1, 1885, the building of an iron bridge at this point was declared a necessary public improvement. Immediately following this resolution, plans and specifications for the substructure were prepared. It was decided by the Board that the distance between the abutments, 578.4 feet, was to be bridged with four spans; thus necessitating the construction of three piers and the two abutments.

The masonry, to be built of bowlder stones, in regular coursed work, was contracted for July 25, 1885, with Messrs. Sekell & Davidson, for \$11,475.16. The unsatisfactory character of the river bed made it necessary to build a little more masonry than was estimated, which increased the cost of the work \$418.51, making the entire cost of the work ready for the bridge, \$11,893.67. The work was completed and accepted Nov. 28, 1885.

The specifications for the bridge were the Theodore Cooper Highway Bridge Specification, modified to meet this particular situation. The bridge, a single intersection Pratt truss, is of four 144.6 feet spans. The roadway between the girders is 23 feet, and the two sidewalks are each 8 feet wide.

The capacity of the bridge is for a moving load of 2,700 pounds per bridge foot.

The contract for the construction of the bridge was awarded January 15, 1886, to the Massillon Bridge Company, for \$20,480.00.

SIXTH AND NEWBERRY STREET BRIDGE.

At a meeting of the Common Council, held September 22, 1884, the constructing of a bridge across Grand River, at Sixth Street on the west side, and Newberry Street on the east side, was declared a public necessity; and the sum of \$6,000 was ordered placed in the budget of taxes to be raised the ensuing year, for the construction of abutments and piers for the bridge.

Plans and specifications for the masonry, to be constructed of bowlder stones, were approved and adopted May 20, 1885, and the contract for the work awarded to John Olson, for \$7,080.67—June 13, 1885.

The masonry stands in from five to seven feet of water, upon bed rock. The east abutment was located in a bed of drift sand, gravel, logs, etc., and the exact depth to bed rock at this point was not ascertained until excavations were made for the construction of the work. It was found to be in what had been the bed of the abandoned portion of the east side canal, and was about two feet lower than the general level of the river bed; thus increasing the amount of masonry, and the cost of the work. The work complete cost \$7,963.02.

BRIDGE.

The specifications for the bridge, called for a bridge similar in design to that to be erected at Pearl Street, except that the spans—four in number—are each 154 feet long, making the entire length 616 feet.

The roadway is 19 feet in the clear between the girders, and the walks are each 6 feet wide. The capacity is for a moving load of 2,200 pounds per foot of bridge.

The work was awarded to the Massillon Bridge Company, January 15, 1886, for \$20,281.00.

APPROACHES.

The contract for grading the west approach was awarded to I. B. Mathewson, for \$1,675.00, Nov. 21, 1885. The roadway has a cedar block driveway 16 feet wide, with cobble stone gutters of 10 feet of width, and the walks are graded 15 feet wide. The slopes are to be protected from injury by a hand-laid rip-rap of large stones.

The east approach will be 49 feet in entire width. The sidewalks to be each 10 feet wide, leaving 29 feet width for roadway; of which the middle 16 feet will be paved with cedar blocks, and the remainder of cobble stone. The contract for this work was awarded February 27, 1886, for \$1,397.00, to John Goldsmith. This sum includes an item of \$500, paid for a strip of land nine feet wide the entire length of the approach.

CITY HALL.

The City Hall has advanced under the skillful hands of contractor W. D. Richardson, in a very satisfactory manner. The walls are up to the cornice, presenting, in a measure, an appearance indicative of what the building will be when completed.

The heavy girders over the court room, and council chamber, and the ceiling beams of the third story, are in place.

The outside walls—the stone work—are rapidly advancing to completion.

WATER MAINS.

The relaying of the force main—substituting iron for the Wyckoff patent pipe, which was leaking badly—has resulted in shortening the time of pumping to maintain the necessary supply of water, and in a reduction in the cost of doing the work.

The new main is 24 inches in diameter, and is connected to the pumps with one 18 and one 10-inch pipe.

The regrading of East Bridge Street necessitated the lowering of the main therein from Clinton to Barclay Streets. The main, a 12inch Wyckoff pipe, was taken out, and an iron pipe laid.

The Wyckoff pipe on the higher levels will probably last several years without much outlay for repairs, but on the section where the pressure is greatest, and where it receives the impact occasioned by the sudden stoppage of elevators, it is developing a weakness in the joints, calling for frequent repairs.

A small amount of pipe has been laid upon petition of residents and requests of the council when the location designated was deemed by the Board as a proper place at this time to lay such pipe.

The following table shows the location of pipe laid, length and cost:

STREET.	FROM	TO	Diameter in inches.	Length.	Hydrants	Valves.	COST.
Jefferson	W. Fulton	Shawmut	4	994	2	2	
E, Bridge	Clinton	Barclay	12	721	3	2	l
E. Bridge	Clinton	Barclay	14	249	1	1	
Stocking	Fourth	Seventh	6	1,227	8	2	¦ ¦ · · · · • • • • •
Clancy	Hastings	Fairbanks	6	1,152	2	2	
Campau Alley	••••••		6	365	 	2	
Ottawa	Newberry	Mason	12	560	1	1	
Ottawa	Mason	Coldbrook	24	1,590	1	1	İ
Mason	Ottawa	E. of Ionia-at	16	404	1		
Mason		West		 			
Total					ļ		\$17,595 T

DOCK OR BUILDING LINES.

By an act of the State Legislature, in an amendment to the city charter, approved June 9, 1885, the Board of Public Works were authorized and empowered to establish dock and building lines on the shores and margin of Grand River, within the corporate limits of the city of Grand Rapids. On direction from the Board, a party was organized for the triangulation of the river, and Mr. R. C. Greiner, draughtsman in the City Surveyor's office, was placed in charge of the party, which consisted of Mesers. Alex. E. Kastl of Detrolt, Mich., Geo. M. Ames of Pokagon, Mich., and Albert Christ of this city. Work was commenced August 11 and completed about December 1, 1885.

The following brief extracts from Mr. Greiner's report, on the completion of the work, will show the amount of work done and with what care and accuracy it was executed:

Miles of river triangulated	4.8
Primary angles read	246
Secondary angles read	187
Buildings located	144
Monuments set	51

Length of base line measures 36,856 feet.

The system includes 171 stations, which are connected by 127 triangles.

The permanent stations are marked in the field either by an iron stake two inches square and thirty inches long, centered with a drill hole in top, or by cedar posts six to eight inches in diameter, and five feet long, set in the ground about four feet. The projecting top was brought nearly to a point and centered with a small nail, and painted, to prevent checking.

The angles of the primary system were read five times direct, and five times with telescope reversed. Below Wealthy avenue, the readings were taken in sets of eight, both direct and reversed, making ten pointings in the first and sixteen in the latter section. The latter section of the triangulation was built up from a carefully measured base line. The network of triangles was continued to the southern limits of the city and closed on another base line, with a difference in the measured and calculated distance of less than half an inch.

During the winter, the work in the field was mapped and presented to the Board for the location of the lines, which work, after devoting much time and study to the matter, was completed and adopted May 3, 1886.

It but remains for me to here express my thanks to the gentlemen engaged in this survey for the thorough and conscientious manner in which the work was executed.

RECAPITULATION.

The following shows the cost of improvements completed during the year:

Street improvements	\$ 40,020 00
Sewerage	15,970 00
Bridges, approaches, etc	50,445 25
Water mains	17,595 77
<u>-</u>	· · · ·

Respectfully submitted,

H. A. COLLAR, City Surveyor.



FOURTEENTH ANNUAL REPORT

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Board of Public Works

AND THE

GIMY OF GRAND RAPIDS, WIGH.

FOR THE FISCAL YEAR ENDING APRIL 30, 1887.

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REPORT

OF THE BOARD OF

PUBLIC * WORKS

To the Common Council of the City of Grand Rapids.

TRANSMITTING THE REPORTS OF THE

COLLECTOR, CITY SURVEYOR, ENGINEER and INSPECTOR

OF THE WATER WORKS.

FOR THE FISCAL YEAR ENDING APRIL 30, 1887.

GRAND RAPIDS, MICH.: EATON, LYON & ALLEN PRINTING Co. 1887.



Board of Public Works.

GEORGE W. THAYER, PRES'T. (Term expires May, 1888.)

WILDER D. STEVENS, - (Term expires May, 1887.)

GEORGE G. BRIGGS, - - (Term expires May, 1887.)

D. E. EMERY, - - - (Term expires May, 1888.)

JAMES N. DAVIS, - - (Term expires May, 1889.)

OFFICERS.

H. A. COLLAR, - - - - - City Surveyor.

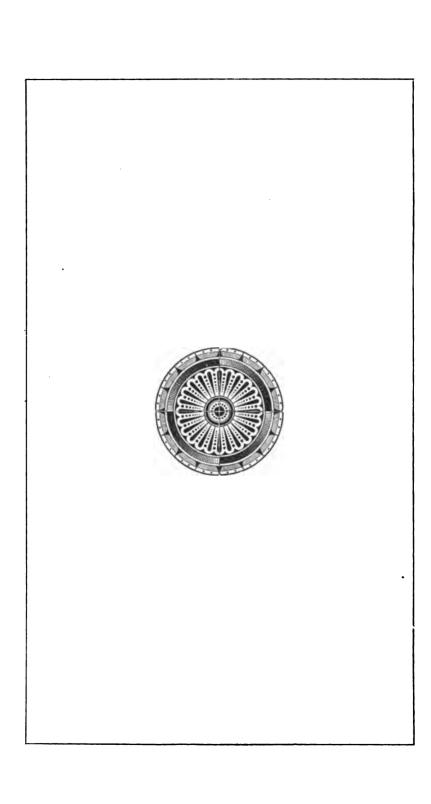
FRED A. TWAMLEY, - - - Clerk and Collector.

THOMAS J. WILLARD, - - Assistant Collector.

GEORGE E. KIRK, - - Engineer at Pumping Works.

JOHN VAN AMBERG, - - - Foreman of Repairs.

A. PER LEE, - - - - - Inspector.



Report of the Board.

To the Honorable Mayor and Common Council of the City of Grand Rapids:

Gentlemen:—The Board of Public Works have the honor to submit herewith their annual report for the year ending April 30, 1887.

The amount of public work done under the supervision of the Board, together with a synopsis of the receipts and disbursements connected therewith, will be found fully set forth in the accompanying reports of the City Surveyor, the Clerk of the Board, and Collector of water rates, the Engineer in charge of the pumping works and the Water Inspector.

The total receipts from water for the past year aggregate \$33,677.25, or \$470.99 less than last year. This decrease in receipts is to be attributed to monthly, instead of quarterly reading of meters, as heretofore; the more frequent readings discover wastage and leaks that are promptly brought to the attention of the consumer, making excessively large bills for metered water much less frequent.

The net earnings for the year are \$13,054.67, or \$5,758.80 less than for the year previous. About one hundred and twenty-eight million more gallons of water were pumped at the works this year than last, exclusive of the pumping that was done in the winter from the canal. This increase in the amount of water pumped represents an additional expense over last year of \$1,449.27.

As the increased number of services for the entire year is but ninety, it is plain to be seen that the excess in the amount of water pumped, has to a large extent been wasted, which waste may be largely attributed to leaky wood pipe. The cost of repairs on iron pipe during the year aggregates \$2,-202.17, exceeding that item last year by \$1,835.26; most of which was expended on the large inlet pipe leading from the settling basin to the pump house.

The cost of repairs on Wyckoff pipe for the year was \$2,011.65, being an excess over last year of \$413.34.

The repairs on pump logs for the year aggregate \$517.01, exceeding cost of previous year by \$395.51.

The necessary repairs on Wyckoff pipe and the pump logs that are embraced in our system of water distribution, are annually growing more burdensome. This large item of expense, coupled with that of pumping the water they waste, with the further fact that the wastage is an unknown quantity that is telling seriously on our water supply, renders it a matter of prudence to provide at an early day for their replacement with iron.

There was expended in improving and caring for the supply creeks \$501.68, being in excess of last year \$235.93.

There was expended on hydrants \$760.42, being in excess of the previous year \$361.80, largely owing to changing Lowry to post hydrants where they have been found on newly improved streets.

The remainder of the increased cost of operation for the past year is made up of numerous smaller items.

The different phases of the unsolved problem of a new water supply, presented during the year, must be so familiar to your honorable body and the general public, that no useful purpose can be served by re-presenting them here. It is very important that a definite and final conclusion be reached at an early day.

The progress of work on the City Hall during the past

year has been very slow; the causes of the unlooked for delay have been beyond the power of the Board to remedy. At the present time more satisfactory progress is being made and we are warranted in the opinion that the building may be fully completed in December.

Respectfully submitted,

GEO. W. THAYER,
WILDER D. STEVENS,
GEO. G. BRIGGS,
DAVID E. EMERY,
JAMES N. DAVIS,
Board of Public Works.





Collector's Report.

Office Board of Public Works, Grand Rapids, May 1, 1887.

To the Honorable Board of Public Works:

Gentlemen—I respectfully submit to your honorable body	the follo	w-
ing report, for the year ending April 30, 1887:		
The number of services on the 1st of May, 1886, for which permits	3	
were issued, were	1,5	523
Special Taps granted		27
Private Mains connected with Works		45
Total	1,5	595
Number of services put in the past year, for which permits were	:	
issued	. 1	102
Private Mains connected with Works		6
Total number of connections on May 1, 1887	1,7	703
Number of services now cut off	. 1	155
Number of services now open	1,8	548
The receipts for the year have been as follows:		
From water rates, fines, etc	\$33,677	25
From water permits	595	50
Total income from Water Works	\$34,272	75
Miscellaneous receipts	317	60
Total receipts for the year	\$34,590	35
Cash on hand May 1, 1886	864	02
	\$35,454	37

ANNUAL REPORT OF THE

Deposits have been made with the City Treasurer during the yes follows:	ar as
To the credit of Water Works income fund	75 4 0
To the credit of general fund	50 00
To the credit of Water Works fund	67 6 0
Total deposits during the year	93 00
	31 37
\$35,4	54 37
Receipts from May 1, 1874, the commencement of collections, to 1, 1886:	Мау
From water rates, fines, etc\$200,26	9 24
From water permits	73 48
From various sources (as per past reports)	8 42
Total)1 14
Receipts for the past year	0 35
Total receipts to date	1 49
Deposits made from May, 1874, to May 1, 1886:	
To the credit of Water Works income fund	6 21
To the credit of various funds (as per past reports) 3,29	0 91
Total\$212,28	7 12
Deposits made the past year	3 00
• •	81 37

Statement of Expenditures.

May 1, 1886, to May 1, 1887.

CONSTRUCTION OF WATER WORKS.

1PIPE SYSTEM.		
Relaying of mains	\$15,259	55
Extension of mains		
2—Pumping Machinery.	\$ 17,856	58
Temporary pump connections	300	00
Gauge.	81	00
3 Meters.		
New meters and setting.	298	65
4 Engineering.		
Plans and Surveys	64	00
Total paid on construction	18,100	28
Paid previous to May 1, 1886		39

MAINTENANCE AND OPERATION OF WATER WORKS.

1-PUMPING.

Salary, Engineer	1,200	00
Salary, Assistant Engineer	780	00
Salary, First Fireman	600	00
Salary, Second Fireman	600	00
Fuel	6,369	30
Repairs to Engine House, painting	50	00
Repairs to pumping machinery, painting	44	95
Supplies, (oil packing, etc.,)	392	86
Pumping by temporary pump	331	20

\$10,367 81

3—REPAIRS AND INSPECTION. Salary, Foreman of Repairs			
Salary, Assistant Collector			
Salary, Assistant Collector	300	300	0
Salary, Foreman of Repairs Salary, Inspector of Water Waste 1—Iron Pipe		600	0
Salary, Foreman of Repairs \$ \$ \$ \$ \$ \$ \$ \$ \$	124	12 4	0
Salary, Inspector of Water Waste 1—Iron Pipe.	,024	024	0'
Salary, Inspector of Water Waste 1—Iron Pipe.	999	999	9
Labor \$1,944 78 Material 257 39 — \$ 2 WYCKOFF PIPE. \$1,984 22 Material 27 43 — \$ 2 3—PUMP LOGS. Labor \$ 492 51 Material 24 50 — \$ 4—VALVES. Labor \$ 50 24 Material 19 39 — \$ 5—HYDRANTS. Labor \$ 310 40 Material 450 02 — \$ 6—METERS. Labor \$ 595 68 Material 159 88	626	626	0
Material 257 89 — \$ 2 Labor \$1,984 22 Material 27 43 — \$ 2 3—PUMP LOGS. Labor \$ 492 51 Material 24 50 — \$ 4—VALVES. Labor \$ 50 24 Material 19 39 — \$ 5—HYDRANTS. Labor \$ 310 40 Material 450 02 — \$ 6—METERS. Labor \$ 595 68 Material 159 88			
2—Wyckoff Pipe. Labor			
2—Wyckoff Pipe. Labor			
Labor \$1,984 22 Material 27 43	,202	202	1
Material 27 43 ———————————————————————————————————			
3—PUMP LOGS. Labor			
3—Pump Logs.	011	Λ1 1	o
Material 24 50 ————————————————————————————————————	,011	011	U
Material 24 50 ————————————————————————————————————			
4—Valves. Labor			
Labor	517	517	0
Material 19 39 \$ 5HYDRANTS. Labor 5 310 40 Material 450 02 \$ 6METERS. Labor 5 595 68 Material 159 88			
5—HYDRANTS. Labor			
5—HYDRANTS. Labor			
Labor	69	69	6
Material			
6—METERS. Labor			
6—METERS. Labor			
Labor	760	760	4
Material			
			
7—Settling Basin.	755	755	5
	100	.00	J
Labor	R ^{ry}	67	9

BOARD OF PUBLIC WORKS.					18
8—Supply Creeks.					
Labor\$	280	68			
Salary, Watchman					
• •			\$	501	68
9—Service Connection.					
Labor	168	60			
Material	506	18			
-			\$	674	78
40.34					
10—Miscellaneous.					
Tools, oils and supplies \$	366	67			
Blowing off	14	00			
Barn, Horse, Wagon, etc	218	42			
Shop and Store House	1	00			
Telephone at Foreman's residence	40	00			
-			\$	640	08
			5	9,826	20
			-	-,	
RECAPITULATION.					
Pumping			5 1	10,367	81
Office and collecting				1,024	
Onice and confecung					

METERS.

Excess of receipts over expenditures..... \$13,054 67

21,218 08

Cost of maintenance and operation.....

Twenty-one meters have been bought during the year, the total number now owned by the city being 467, of which there are set and in operation of the following manufacturers:

14	ANNUAL REPORT OF THE	
Ball & Fitts I	Rotary	129
Worthington .	•••••	88
Crown		81
Ball & Fitts I	Piston	52
Duplex	•••••	35
m		385
There ar	e in the shop the following meters:	
Ball & Fitts I	Rotary	37
Worthington.		3
Crown		11
Ball & Fitts	••••••	27
Duplex		4
Total	 -	82

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LEAKS ON DISTRIBUTION MAINS.

The following table shows the number, cause and location of the various leaks on the mains, during the year:

NAME OF STREET.	KIND OF PIPE.	INCHES.	Монтн.	DAY.	CAUSE.
Coldbrook	Iron	12	May	3	Joint
Broadway	Wyckoff	12	Мау	14	Joint
Clancy	Pump Log	6	Мау	24	Split
Scribner	Wyckoff	8	June	1	Joint
Ionia	Wyckoff	в	June	2	Joint
Scribner	Wyckoff	8	June	3	Joint
Campau	Wyckoff	4	June	4	Joint
Clancy	Pump Log	6	June	5	Split
Scribner	Wyckoff	12	June	7	Joint
Coldbrook	Wyckoff	12	June	9	Joint
Scribner	Wyckoff	н	June	16	Joint
· Coldbrook	Iron	20	June	17	Joint
Coldbrook	Iron	20	June	21	Joint
S. Division	Wyckoff	12	July	1	Joint
Broadway	Wyckoff	12	July	5	Joint
Coldbrook	Iron	20	July	6	Joint
N. Division	Wyckoff	12	July	14	Joint
Broadway	Wyckoff	12	July	15	Joint
Broadway	Wyckoff	12	July	16	Joint
Broadway	Wyckoff	12	July	19	Joint
Fifth	Wyckoff	12	, July	21	Joint
Broadway	Wyckoff	12	July	23	Joint
Fountain	Pump Log	6	July	27	Joint
Broadway	Wyckoff	12	July	28	Joint
Coldbrook	Iron	20	July	30	Joint
Fountain	Pump Log	6	August	24	Split
Scribner		8	August	27	Joint
Scribner	Wyckoff	8	August	27	Joint
	Iron	l "	1	l	1

LEAKS ON DISTRIBUTION MAINS—Continued.

NAME OF STREET.	KIND OF Pipk.	INCHES.	Монтн.	Day.	Cause
Broadway	Wyckoff	12	August	81	Joint
Broadway	Wyckoff	12	September	2	Joint
Broadway	Wyckoff	12	September	7	Joint
Broadway	Wyckoff	12	September	8	Joint
Broadway	Wyckoff	12	September	10	Joint
Broadway	Wyckoff	12	September	14	Joint
Coldbrook	Iron	20	September	14	Joint
Broadway	Wyckoff	12	September	16	Joint
Scribner	Wyckoff	8	September	20	Joint
Coldbrook	Iron	20	September	20	Joint
Eighth	Wyckoff	12	September	20	Joint
Broadway	Wyckoff	12	September	24	Joint
Eighth	Wyckoff	12	September	25	Joint
E. Fulton	Wyckoff	6	September	25	Joint
Coldbrook	Iron	20	October	1	Joint
Broadway	Wyckoff	12	October	5	Joint
Broadway	Wyckoff	12	October	5	Joint
Broadway	Wyckoff	12	October	6	Joint
Scribner	Wyckoff	8	October	6	Joint
N. Division	Wyckoff	12	October	7	Joint
Broadway	Wyckoff	12	October	8	Joint
Broadway	Wyckoff	12	October	9	Joint
Crescent avenue	Pump Log	6	October	9	Joint
Coldbrook	lron	20	October	11	Joint
Canal	Wyckoff	12	October	12	Joint
Mason	Iron	16	October	29	Joint
N. Canal	Wyckoff	12	October	30	Joint
Lyon	Wyckoff	14	November	3	Joint
N. Canal	Wyckoff	12	November	12	Split
Coldbrook	Iron	20	November	18	Joint
Scribner	Wyckoff	8	November	24	Joint
Coldbrook	Iron	20	November	25	Joint
Broadway	Wyckoff	12	November	30	Joint

LEAKS ON DISTRIBUTION MAINS—CONTINUED.

NAME OF STREET.	Kind of Pips.	INCHES.	Монтн.	DAY.	CAUSE
Broadway	Wyckoff	12	December	1	Joint
Broadway	Wyckoff	12	December	6	Joint
Broadway	Wyckoff	12	December	7	Joint
Broadway	Wyckoff	12	December	10	Joint
N. Canal	Iron	24	December	12	Joint
Crescent avenue	Pump Log	6	December	13	Split
Broadway	Wyckoff	12	December	17	Joint
Broadway	Wyckoff	12	December	20	Joint
Broadway	Wyckoff	12	December	23	Joint
Fountain	Pump Log	6	December	27	Split
Lyon	Iron	6	December	80	Joint
S. Ionia	Wyckoff	6	December	81	Joint
Scribner	Wyckoff	8	January	6	Joint
Broadway	Wyckoff	12	January	7	Joint
Barclay	Wyckoff	14	January	13	Joint
N. Canal	Wyckoff	8	January	17	Joint
N. Canal	Wyckoff	12	February	1	Joint
Fountain	Pump Log	6	February	16	Split
Broadway	Wyckoff	12	February	17	Joint
Broadway	Wyckoff	12	February	21	Joint
Broadway	Wyckoff	12	February	28	Joint
Fountain	Pump Log	6	February	25	Split
S. Division	Wyckoff	12	February	28	Joint
N. Canal	Wyckoff	24	March	7	Plug
Kent	Wyckoff	6	March	10	Joint
Broadway	Wyckoff	12	March	11	Joint
Broadway	Wyckoff	12	March	14	Joint
S. Division	Wyckoff	12	March	21	Joint
Prospect	Pump Log	6	March	22	Split
Fountain	Pump Log	6	March	26	Split
Broadway	Wyckoff	12	April	4	Joint
Broadway	Wyckoff	12	April	6	Joint

LEAKS ON DISTRIBUTION MAINS-CONTINUED.

	_====	== =			
. NAME OF STREET.	KIND OF Pipe.	INCHES.	Монтн.	DAY.	Cause
Broadway	Wyckoff	12	April	8	Joint
Fountain	Pump Log	6	April	8	Split :
Crescent avenue	Pump Log	6	April	11	Split
Prospect	Pump Log	6	April	14	Split
Coldbrook	Iron	20	April	15	Joint
Crescent avenue	Pump Log	6	April	22	Split
Coldbrook	Iron	20	April	25	Joint
N. Canal	Wyckoff	8	April	28	Joint
Clinton	Pump Log	6	April	30	Joint
		- ::	'_t	_= .	=

Total number of leaks, 104.

The total length of water mains now laid is 27-6 miles.

Number of hydrants, 290.

Number of valves, 187.

Respectfully submitted,

FRED A. TWAMLEY,

Clerk and Collector.



Engineer's Report.

To the Honorable Board of Public Works:

GENTLEMEN—I respectfully submit the following report for the year ending April 30, 1887:

The following table shows the number of days run for each month; number of revolutions made; gallons of water pumped; amount of wood burned, and cost of the same:

MONTH.	DAYS RUN.	TIME	un.	No. of Revolu- tions.	GALLONS OF WATER PUMPED.	CORDS OF WOOD.	Cost of
May	81	н. 603	м. 10	629,278	62,927,800	272	\$ 435 20
June	80	796	40	714,870	71,487,000	250	477 55
July	31	795	20	803,102	80,310,200	262	542, 84
August	81	744	40	748,420	74,842,000	259	490 74
September	30	716	50	780,560	78,056,000	826	489 00
October	81	740	50	767,770	76,777,000	325	403 30
November	80	690	40	784,220	73,422,000	286	486 20
December	31	885	20	841,070	84,107,000	365	620 50
January	81	777	00	774,248	77,424,800	325	628 85
February	28	629	50	667,734	66,773,400	334	669 40
March	31	632	00	687,476	68,747,600	306	678 20
April	30	623	10	653,992	65,399,200	274	602 80
Totals	365	8585	30	8747,740	874,774,000	3,584	\$8.519 08

The average daily consumption for the year has been. 2,396,367	12-100 g	al.
Against an average the previous year of 2,046,080	93-100 g	al.
The total cost to pump one million gallons of water		
into reservoir, elevation 156 feet \$ 11	.72 66-1	00
The total cost of fuel to pump one million gallons of		
water into reservoir	7.45 2-	10
The running expenses for the year have been:		
For repairs.	\$ 15	47
For supplies, packing, etc	325	03
For Wood	6,519	80
For Salaries of Engineers and Firemen	3,180	00
Painting and kalsomining Engine House	94	95
Mercurial column	81	00
Oil cups for Engine	42	64
Total	\$10,258	17

Respectfully submitted,

GEORGE E. KIRK,

Engineer.



Water Inspector's Report.

GRAND RAPIDS, MICH., May 1, 1887.

To the Honorable Board of Public Works:

Gentlemen—I respectfully submit the following report for the year ending April 30, 1887:

Total number of premises supplied with water, (not metered)	1698
Total number of fixtures, 4615, as follows:	
Baths	212
Closets	1190
Wash Basins	230
Sinks	847
Urinals	67
Fountains	6
Hydrants	1496
Sill Cocks and Street Washers	346
Miscellaneous	223
All of which have been carefully inspected with the following res	ults:
Number of premises inspected	1698
Number of leaks discovered	135
Notices served on water consumers for violation of rules	320
Special notices to plumbers and drain layers	56
Number of inspections	3597
Number of services cut off for violation of rules.	19
Number of services cut on	5

The following table shows the number, kind, and location of fixtures not metered:

WARDS.	BATHS.	CLOSETS.	WASH BASINS.	Sinks.	URINALS.	Fountains.	HYDRANTS.	SILL COCKS AND ST. WASHERS.	Cro	ND OF OSKTS	MISCELLANEOUS.	NUMBER OF PREMISES.	CLOSETS NOT
First	9	67	10	81	7	0	113	19	37	30	25	148	ļ
Second	87	279	44	149	13	4	240	53	97	182	87	258	ļ
Third	115	516	106	278	8	2	475	155	178	830	88	516	8
Fourth and Fifth	25	173	21	168	5	0	441	41	86	87	26	468	
Sixth and Seventh	5	58	5	47	9	0	107	19	81	22	4	137	ļ
Eighth	15	83	15	84	5	0	105	49	46	37	20	154	 .
School and Engine Houses.	6	19	29	40	18	0	15	10	0 8 n		28	22	
Total	212	1190	230	847	65	6	1496	346	11	oted. 90	223	1698	8

The metered service has had a monthly reading, and wherever a meter has shown excessive use, notice has been sent to persons interested, and the premises inspected with the least possible delay.

It has been found necessary in many instances, (where premises were unoccupied,) to test the condition of services by turning water off and on.

Respectfully submitted,

A. PER LEE,

Water Inspector.



City Surveyor's Report.

Board of Public Works Office, GRAND RAPIDS, MICH., May 1, 1887.

To the Honorable Board of Public Works:

GENTLEMEN—I have the honor to submit herewith my report of work completed under your direction since May 1, 1886:

STREETS.

There are in the city 140.98 miles of streets, of which 91.04 miles are on the east side of the river, and 49.94 miles on the west side, of which there are:

Graded and paved with wood and stone	6,614 miles.
Graded and paved with wood	188 miles.
Graded and paved with stone	1,178 miles.
Graded, graveled and gutters paved	41,577 miles.
Graded and graveled	32,195 miles.
Graded	3,878 miles.
Unimproved	55,350 miles.

Grade lines have been approved and adopted for 42,454 linear feet of streets, as per the following table:

STREETS ON WHICH GRADE LINES HAVE BEEN ESTABLISHED.

STREET.	FROM.	то.	LENGTH IN FRET.
Jefferson avenue	Maple street	Fifth avenue	3.488
North College avenue	East Leonard street	Sweet street,	2,651
East Fulton street	Division street	Jefferson avenue	921
Pettibone street	West Bridge street	Fourth street	1,582
North Jefferson street	West Bridge street	Third street	1,112
South Jefferson street	West Bridge street	Chatham street	594
Oakland avenue	Wealthy avenue	Fifth avenue	2,619
Second avenue	Grandville avenue	Oakland avenue	912
South Lane avenue	West Bridge street	Sibley street	1,290
Beech avenue	Third street	Fourth street	330
South Front street	South line, section 25	West City Limits	4,000
Shawmut avenue	South Front street	Straight street	2,721
Caledonia street	Plainfield avenue	Taylor street	1,010
South Pine street	Jackson street	Sibley street,	294
Williams street	South Spring street	Ellsworth avenue	1,079
Indiana street	Shawmut avenue	Jackson street	660
Earle street	South Front street	Straight street	1,416
West Broadway	Earle street	Butterworth avenue	215
South Division street	Hall street	Wealthy avenue	5,215
Wealthy avenue	Madison avenue	East street	2,572
East street	Wealthy avenue	Lake avenue	1,893
Legrand street	Canal street	Taylor street	585

The following tables show the street improvements which have been brought to completion during the year; also the character and cost of each improvement:

NAME OF STREET.	FROM.	TO.	KIND OF IMPROVEMENT.	Length in Feet.	Length Contract Est. In- in Feet. Price. ciden'ls	Est. In- ciden'ls	Total Cost.	Per Foot,	CONTRACTOR.
Sixth street	North Front-st.	Stocking-st	Graded graveled and gutters paved	3.432	\$4,500 00	\$300 00	\$4,800 00	\$1 48	B. Livingstone
East Bridge street Canal-st	Canal-st		Clancy-st Regra'd, grav'd & gutters pav. sto'e curb.	5,369	10,479 00	521 00	11,000 00	7 87	Lamoreaux & Martin
East Bridge street	Clancy-st		E. City Limits. Graded, graveled and gutters paved	8,658	6,660 00	00 0##	7,100 00 1 94	1 94	R. Pickett
Ottawa street		East Bridge-st. Coldbrook-st	Graded, graveled and gutters paved	4,215	6,333 00	287 00	6,600 00 1 56	1 56	C. Prange
South Waterloo street.		Cherry-st	East Fulton-st. Cherry-st Graded, graveled and gutters paved	1,418	3,439 00	121 00	3,560 00	2 52	Lamoreaux &
Adams street	S. Division-st	Wallen-st	Graded, graveled and gutters paved	1,720	2.850 00 150 00	150 00	3,000 00	5 08	I. B. Mathewson
Fremont street	West Bridge-st.	Fourth-st	Graded and graveled	1,514	1,000 00	100 00	1,100 00	0 73	J. McDermott
Pettibone street	West Bridge-st.	West Bridge-st. Fourth-st	Graded and graveled	1,512	1,177 00	103 00	1,280 00	18 0	McDermott & Tennis
Louis street	East Fulton-st.	The River	Gra'd & pav'd, wood & stone, stone curb.	1,608	5,050 00	230 00	5.280 00	8	I. B. Mathewson
South Spring street	East Fulton-st.	Wealthy-av	Graded, graveled and gutters paved	2.573	5,556 00	254 00	5,810 00	2 25	A. & J. Rens
Barclay street		East Bridge-st. Fountain-st	Regraded, graveled and gutters paved	1.789	3,250 00	210 00	3,460 00	2 00	J. Collins
McReynolds street	Fourth-st	W. Leonard-st.	Graded and graveled	3,637	4,895 00	295 00	5,190 00	1 48	A. & J. Rens
Crosby street	North Front-st.	North Front-st. Alpine-av	Graded, graveled and gutters paved	3,328	5,670 00	290 00	5,980 00	1 79	Schneider & Wagemaker
Jefferson avenue	Maple-st	Wealthy-av	Gra'd & pav'd, wood & stone, stone curb.	847	3,439 00	221 00	3,660 00	4 88	I. B. Mathewson
Jefferson avenue	Fifth-av	Wealthy-av	Graded, graveled and gutters paved	2,636	3,900 00	00 008	4,200 00	1 59	F. Childs
North Ionia street	Fountain-st	Lyon-st	Gra'd & pav'd, wood & stone, stone curb.	280	2,600 00	100 00	2,700 00	3 2	J. Kloote
North Ionia street	Fountain-st		Monroe-st Gra'd & pav'd, wood & stone, stone curb.	606	1,098 00	182 00	1,280 00 4 14	† 14	C. Prange
Pearl street	N. Division-st.,	North Ionia-st.	N. Division-st North Ionia-st. Gra'd & pav'd, wood & stone, stone curb.	188	760 00	70 00		4 41	830 00 4 41 J. Kloote

.

Contrac-	J. Kloote J. Collins J. Kloote C. Prange J. DeBruin. J. DeBruin. J. DeBruin. J. Collins J. B. Math- J. G. Wath- J. Collins J. Collins J. Collins J. Collins J. Collins
Con	J. Kloot J. Kloot J. Kloot J. Kloot J. Kloot J. Kloot J. DeBr J. DeBr J. DeBr J. DeBr J. DeBr J. Collin J. Collin J. Collin J. Collin J. Collin
Total Cost.	\$1,050 00 \$70 00
FSTIMATED INCIDENTALS.	5. 5. 5. 5. 5. 5. 5. 5. 5. 5. 5. 5. 5. 5
CONTRACT PRICE.	\$ 900 00 1144 00 175 00 175 00 175 00 176 00
Гелстн ім Гевт.	737 { 1113 }
CATCH BASINS.	۵ : ت ت ت ت ت
МАИ-	ם מח מחחחמ מה מ
PAMP-	
SIZB AND KIND.	12 inch glazed pipe 9 inch glazed pipe 12 inch glazed pipe 12 inch glazed pipe 9 inch glazed pipe
LOCATION,	First and Michigan Alleyblk 4, Ellsworth add From Street stores, thence w. to Alleyblk 4, Ellsworth add From Street stores of Wealthy avenue to Goodrich st. Alley blk 4, El. Dexter. From Trowhriggs street to East Bridge street. From Michigan street wand from 50 feet e. of From Street wand from 50 feet e. of From Land accure c. to Fromont street. W. Division street. From California street to Silvey street. W. Division street. From California street to Silvey street. W. Division street. From California street to Silvey street. M. Lonia street. From Michigan street to Silvey street. From Michigan street to Silvey street. From Margings street to Silvey street. From Michigan street to Silvey street. From Margings street to California street. From Hastings street to Trowhridge street. Side ditch. From East Bridge street. From Hastings street to Trowhridge street. Side ditch. From Hastings street to Trowhridge street. S. College avenue. From Silve Silve Street to Trowhridge street. From Silve Silve Street to Trowhridge street. From Silve Street in Fullon street. M. Union street and I From Silve Street to Trowhridge street. From Silve Street in Street to Marging. From Silve Street to Trowhridge street. From Street to Trowhridge street. From Silve Street to Trowhridge street. From Street to Trowhridge street.
NAME OF STREET.	Alley blk 4, Ellsworth add F Alley blk 4, Ellsworth add F Fourth street. S. Lafayette street. W. Division street. W. Division street. F. W. Division street. F. W. Division street. F. W. Division street. F. W. Innia street. F. Sheley street. F. Shely street. F. Alley blk 5, Porter's add F. Shely street. F. College avenue. F. College avenue. F. College avenue. F. W. Union street. F. W. Union street. F. College avenue. F. W. College avenue. F. College avenue. F. College avenue. F. Lincoln street.

.

The foregoing tables show 57,821 linear feet of street improvements made, of which there has been:

Graded and paved	3,815 feet.
Graded, graveled and gutters paved	33,634 feet.
Graded and graveled	9,167 feet.
Graded	941 feet.
Regraded and paved or graveled	5,095 feet.

52,652 feet.

In the improvements included in the above statement, there has been set 15,408 feet of Medina, N. Y., sand-stone curb.

The total cost of the improvements noted has been \$112,230.00.

SEWERS.

With but two exceptions, all sewers constructed during the year have been lateral work, and most of them quite short lines.

The table following, shows the location, length, size, kind and cost of sewers constructed:

There had been expended, in the early spring, for filling back of the bridge abutments, the sum of \$189.00 on a contract awarded to C. Prange.

SIXTH AND NEWBERRY STREET BRIDGE.

This bridge was contracted for with the Massillon Bridge Company, as before reported. The work was completed and accepted August 27. The bridge cost \$20,281.00.

The approaches to the bridge were completed, and the bridge put into condition for public use early in September.

For the west side\$	1,684	10
For the east side, including \$500 for land	1,437	53

WATER MAINS.

Nearly all the work of laying mains has been made necessary by the regrading of streets, and the removal of defective Wyckoff pipe.

The wrought iron main crossing the river at Mason and Eighth streets, had become so leaky as to be entirely useless, making the laying of a new main at that point a matter of necessity.

The old main was 12 inches in diameter; the new cast iron main is of 16 inches diameter.

This main is laid in a trench excavated in the rock bottom of the river, to such depth as to enclose the pipe completely when filled, except for a short distance in the main channel, where it projects from four to six inches above the river bed. At this place it is heavily ripraped for protection. The work was performed by Mr. W. R. Coats, of Kalamazoo, Michigan, under a contract awarded August 6, 1886. The length of the main in the river is 780 feet.

The following table shows the location of the pipe laid, together with size, length, etc., of such mains:

							 -
STREET.	FROM	то	Diameter in inches	Length in Feet.	New Hydrants.	New Valves.	REMARKS.
Barclay	East Bridge	Lyon	(4) (14)	(551) (496)			{ 4in log removed { 14"Wyff pipe "
Bartlett	Ellsworth ave.,	West	4	400	ļ	1	New line
Campau	Louis	Pearl	5	386			{ 4 in Wyckoff pipe } removed
East Bridge	N. Lafayette	N. College	10	1320	4	2	New Line
Ellsworth ave	Cherry	Bartlett	8	660			{ Iron pipe relaid. } Street regraded.
Louis	N. Waterloo	Campau	8	430	1		6 in Wyff removed
Mason	Ottawa	{ Across river } to Front st . }	16	1543			Removed 12 in. Wyff & wrought iron pipe
Eighth	N. Front	Broadway	16	898			12in Wyffremoved
Pearl	Campau	The river	6	260			6 in Wyff removed

The total cost of the work was

17.856 58

In relaying water mains, all Lowry hydrants are removed to the sidewalks of the street, and have an extension placed upon them, thus converting them into post hydrants.

The extension, an invention of Mr. J. Van Amberg, our superintendent of repairs, has two hose and one steamer connection, making them equal to the best post hydrants made.

A small timber reservoir, containing about four hundred and fifty barrels, was constructed in Lincoln street, near West Leonard street. It is situated in a bed of water bearing gravel, which keeps it filled to overflowing.

The reservoir was constructed by John Rens, under a contract awarded December 4, 1886, for \$174.90.

CITY HALL.

Owing to many delays progress on the building has been very slow. The structure is under roof and has received two coats of plaster. The plasterers have given the fourth story its finishing coat.

STEAM HEATING.

The contract for steam heating the building was awarded February 24, 1886, to the Detroit Metal and Heating Works, for \$11,909.81.

After the building was enclosed, during the cold weather of early Spring, steam was turned on and the walls warmed and dried to admit of plastering.

The steam fitting is completed except placing the radiators in position, which cannot be done until the floors are laid.

RECAPITULATION.

The following table shows the cost of the improvements brought to completion during the year:

Street and alley improvements\$	112,230 00
Sewerage	17,640 00
Bridges, approaches, &c	52,819 10
Water mains, &c	17,356 58
Reservoir in Lincoln street	174 90

\$ 200,220 58

Respectfully submitted,

H. A. COLLAR,

City Surveyor.





OF THE -

BOARD of PUBLIC WORKS

- OF THE CITY OF-

Grand Rapids, Michigan.

For the Fiscal Year Ending April 30, 1888.

GRAND RAPIDS, MICH.:
EATON, LYON & ALLEN PRINTING COMPANY.

1888.



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ANNUAL REPORT

-OF THE-

BOARD OF

Public & Works

To the Common Council of the City of Crand Rapids,

TRANSMITTING THE REPORTS OF THE

Collector, * City * Surveyor, * Engineer * and * Inspector

OF THE WATER WORKS,

THE FISCAL YEAR ENDING APRIL 30, 1888.

GRAND RAPIDS, MICH.: EATON, LYON & ALLEN PRINTING COMPANY. 1588.

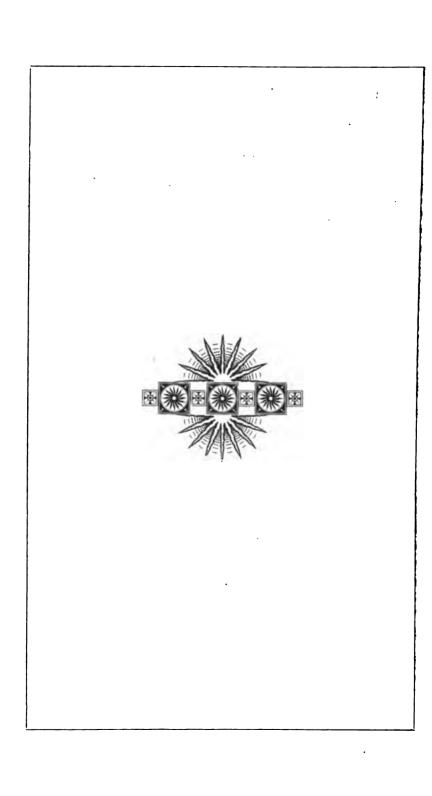


Board of Public Works.

GEORGE G. BRIGGS, PRES'T (Term expires May, 1890.)
I. M. WESTON, MAYOR(Term expires May, 1889.)
WILDER D. STEVENS(Term expires May, 1890.)
JAMES N. DAVIS(Term expires May, 1889.)
W. R. SHELBY(Term expires May, 1891.)
FREEMAN GODFREY (Term expires May, 1891.)

Officers.

H. A. Collar City Surveyor.
FRED A. TWAMLEY Clerk and Collector.
THOMAS J. WILLARD Assistant Collector.
GEORGE E. KIRK Engineer at Pumping Works.
JOHN VAN AMBERG Foreman of Repairs.
A. PER LEE Inspector.



Report of the Board.

GRAND RAPIDS, MICH., June 1, 1888.

To the Honorable Mayor and Common Council of the City of Grand Rapids:

GENTLEMEN:—The annual report of the Board of Public Works for the year ending April 30, 1888, together with reports from the City Engineer, the Collector of water rates, the Engineer in charge of pumping works, and the water Inspector, are herewith respectfully transmitted for the consideration of your honorable body.

The reports above named will be found to contain, in detail, full information concerning the operations of the several departments, during the year just closed. They furnish, also, unmistakable evidence of the city's growth, and of the increasing responsibilities in caring for and in carrying on its public works.

It appears from the report of the Collector that the total income from the water works, during the past year, was \$41,542.68, an increase over former year of \$7,269.93.

Cost of maintenance, \$22,483.58.

Showing excess of receipts over expenditures of \$19,059.10, and, if proper allowance was given for the fire protection afforded by the two hundred and ninety-six hydrants now in service, at the low rate of forty dollars each, the works would

show a net gain for the year of \$30,899.10, thus giving to the plant a valuation, upon a four per cent. basis, of nearly \$800,000.00.

As a matter of justice to this department, the important and expensive service rendered in furnishing a supply of water for fire protection should be recognized, and it is hoped your honorable body will at once make provision for paying to the water department a reasonable compensation for hydrant rental.

The property of the city, in its water works, is being constantly improved as the means for such betterments are found available. The last of the old pump-logs are now being replaced with iron mains, and, within sixty days, a new boiler, of approved construction, will be placed in service at the pumping works, together with an additional pump having a daily capacity of five and a half millions of gallons.

These additional facilities, with the new influent pipes and well, already completed, will remove any fears as to shortage of supply or the recurrence of a water famine in the future.

The necessary funds having been provided for such purpose, iron mains were substituted for the Wyckoff pipes in Broadway, North Canal, and South Division streets, during the past season, and a saving in the cost for repairs upon "Wyckoff pipes" of \$904.04 is shown as a result.

Expenditures made under the direction of the Board, during the past year, including the erection of Engine House, number three, and the hospital for contagious diseases, amount to \$178,798.70.

The City Hall is rapidly nearing completion and will be ready for occupancy within sixty days. Trusting the several

departments of the city's government may soon be in the enjoyment of its ample and commodious facilities,

We are, very respectfully,

GEORGE G. BRIGGS.

JAMES N. DAVIS,

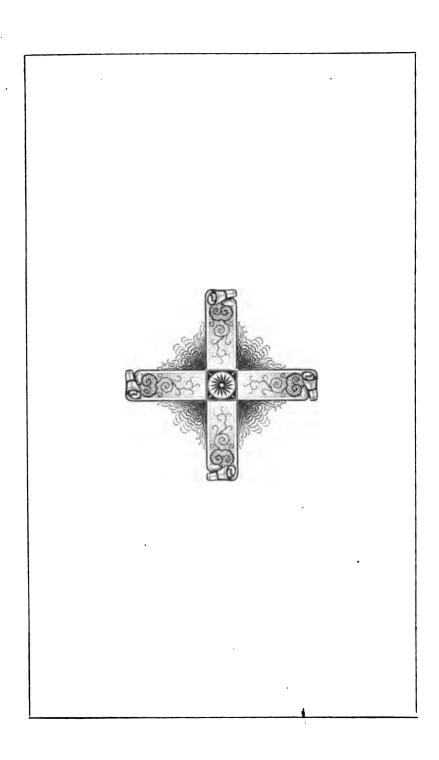
WILDER D. STEVENS,

W. R. SHELBY,

FREEMAN GODFREY,

Board of Public Works.





Collector's Report.

OFFICE BOARD OF PUBLIC WORKS, GRAND RAPIDS, May 1, 1888. To the Honorable Board of Public Works: GENTLEMEN:—I respectfully submit to your honorable body the following report, for the year ending April 30, 1888. The number of services on the first of May, 1887, for which permits were issued, were..... 1,625 Special taps granted 27 Private mains connected with works 51 1.703 Number of services put in the past year, for which permits were issued..... 192 Private mains connected with works..... 10 Total number of connections on May 1, 1888..... 1,905 Number of services now cut off 209 Number of services now open 1,696 The receipts for the year have been as follows: From water permits 1,152 00 Total income from water works..... \$41,542 68 Miscellaneous receipts..... 153 11 Total receipts for the year \$41,695 79 Cash on hand May 1, 1887 1,361 37 \$43,057 16

Deposits have b	been	made with	the City	Treasurer of	during
the year as follows:					

the year as follows:		
To the credit of water works income fund	12,052	40
To the credit of general fund	25	00
To the credit of water works fund	128	II
Total deposits during the year	 2,205	<u></u> -
Cash on hand to balance	851	65
	13,057	16
Receipts from May 1, 1874, the commencement of tions, to May 1, 1887:	colle	ec-
From water rates, fines, et caetera\$2	33,976	49
From water permits	9,168	98
From various sources (as per past reports)	4,546	02
Total\$24	 17,691	49
Receipts for the past year	£1,695	79
Total receipts to date	39,387	28
Deposits made from May, 1874, to May 1, 1887:		
To the credit of water works income fund\$20	42,72 I	61
To the credit of various funds (as per past reports)	3,608	51
Total	——- 46,330	12
Deposits made the past year	12,205	51
Cash on hand to balance	851	65



STATEMENT OF EXPENDITURES.

May 1, 1887, to May 1, 1888.

CONSTRUCTION OF WATER WORKS.

1-PIPE SYSTEM.

I—IIIE DISIEM.		
Relaying of mains	\$25,198 2,293	
2—River Connection	\$27,492	84
Suction pipe in river and crib	4,384	28
3-Pumping Machinery.		
Boiler	130	10
Pump	46	50
4-Meters.		
New meters and setting	957	05
Total paid on construction	\$33,010	77
Paid previous to May 1, 1887	\$503,166	62
Cost of works to date		

MAINTENANCE AND OPERATION OF WATER WORKS.

I-PUMPING.

Salary, engineer	\$1,200	00
Salary, assistant engineer	780	00
Salary, first fireman	600	00
Salary, second fireman	600	00
Fuel	8,815	15
Repairs to pumping machinery and suction pipe	258	95
Supplies, (oil, packing, etc.)	381	76
	\$ 12.635	86

12	FIFTEENTH ANNUAL REP	ORT	OF			
	2—Office and Coli.ect	ING.				
One-fourth	salary, clerk and collector				300	00
Salary, assis	tant collector				600	00
Stamps, pri	nting, etc	• • • • •	• • • • •	• •	129	56
	3—Repairs and Inspect	ion.		_	\$ 1,029	56
Salary, fore	nan of repairs		.		999	96
Salary, insp	ector of water waste	 .			739	50
	I-IRON PIPE.					
Labor		\$	785	63		
Material			198	43		
				_	\$ 984	o 6
	2-WYCKOFF PIPE.					
Labor		\$ I,	045	38		
Material			62	2 3		
	-			_	\$ 1,107	61
	3—Pump Logs.					
Labor		\$	156	о8		
Material			13	50		_
	-				\$ 169	58
	4-Valves.	,				
Labor		\$	55	16	•	
Material			5	90		_
	-			_	\$ 61	06
	5-HYDRANTS.					
Labor		\$	545	o 6		
Material			139	16		
•	-				684	22
	6-METERS.					
Labor		\$	979	86		
Material	•••••		152	23		
	-			_	\$ 1,132	09

7—Reservoir.		
Labor	• • • • • • • • • • • • •	47 75
8—SETTLING BASIN.		
Labor		149 62
9—Supply Creeks.		.,
Labor	\$ 287 48	
Salary, watchman	279 50	
—	-79 30	\$ 566 98
10—Service Connection	N.	
Labor	\$ 322 62	
Material	727 68	
_		\$ 1,050 30
10—Miscellaneous.		
Γools, oils and supplies	\$ 323 67	
Blowing off	20 50	
Barn, horse, wagon, etc	. 160 61	
Shop and store house	8o 65	
Rent of telephone at foreman's residence	40 00	
Rent of land and water rights at Fisk's lake	500 00	\$ 1,125 4
		\$ 8,818 10
RECAPITULATION.		
Pumping		4 10 62r 8
Office and collecting		1,029 5
Repairs and inspection		8,818 10
Total paid for maintenance and operation		\$ 22,483 5
Income for the year	· · · · · · · · · · · · · · · · · · ·	41,542 6
Cost of maintenance and operation	• • • • • • • • • • • • • • • • • • • •	22,483 5
Excess of receipts over expenditures	• • • • • • • • • • • • • • • • • • • •	\$ 19,059 10
METERS.		

purchased during the year, make 492 meters owned by the city as follows:

NAMES OF METERS.	RUNNING	IN SHOP	Тотак
Ball and Fitts Rotary	112	25	137
Worthington	149	12	161
Crown	87	8	90
Ball & Fitts' Piston	88	27	65
Duplex	87	2	89
Total.	428	69	492

Sixty-four leaks on mains have been repaired; of these 43 were on Wyckoff pipe, 16 on iron pipe, and 5 on pump logs.

The total length of water mains now laid is 28 miles.

Number of hydrants, 296.

Number of valves, 193.

Respectfully submitted,

FRED A. TWAMLEY,

Clerk and Collector.



Engineer's Report.

To the Honorable Board of Public Works of the City of Grand Rapids:

Gentlemen—I have the honor to submit my annual report of the work done by the pumping engines for the year ending April 30, 1888.

The following table shows the number of gallons of water pumped, amount of wood burned, and the cost of the same:

MONTH.	Tim Ri	IE UN.	No. of Revolu-	GALLONS OF WATER PUMPED.	OF WOOD.	OF WOOD.
May.'	н. 871	м. 10	877,412	87,741,200	3931/2	\$ 768 40
June	875	50	871,280	87,128,000	846	761 20
July	898	10	919,900	91,990,000	871	816 20
August	964	40	949,218	94,921,800	418	919 60
September	826	40	830,254	83,025,400	86 <u>4</u>	800 80
October	761	40	754,880	75,433,000	350	558 75
November	749	20	751.008	75,100,800	391	606 05
December	742	3 0	788,512	78,851,200	36 1	687 75
January	906	50	912,824	91,282,400	4121/2	798 05
February	850	50	848,954	84,895,400	359	668 00
March	811	20	867,868	86,736,800	8521/2	746 50
April	735	50	764,702	76,470,200	287	620 55
Totals	9994	50	10,185,762	1,013,576,200	4,4051/2	\$ 8,746 8

The running expenses for the year have been:

For repairs	\$ 165 73
For supplies, packing, etc	286 86
For wood	8,746 85
For salaries of engineers and firemen	3,180 00

^{\$ 12,379 44}

The average daily consumption of water for the year	
has been	2,769,333 gallons.
Against an average the previous year of	2,396,367 gallons.
The total cost to pump one million gallons of water into	
reservoir, elevation 156 feet	\$ 12,21 36-100
The total cost of fuel to pump one million gallons of	
water into reservoir	\$ 8,62 92-100
Owing to an advance of 17 cents a cord on wood, the	ne cost of pumping
per million gallons has been slightly increased over last ye	ear, but this trouble
will be obviated when the boiler now under construction is	s ready for use.
Respectfully submitted,	-

GEORGE E. KIRK,

Engineer.



Water Inspector's Report.

GRAND RAPIDS, MICH., May 1, 1888.

To the Honorable Board of Public Works:

GENTLEMEN—I respectfully submit the following report for the year ending April 30, 1888:

Total number premises supplied with water, (not metered)	1,937
Total number of fixtures 5,257, as follows:	
Baths	260
Closets	1,420
Wash basins	240
Sink faucets.	974
Urinals	73
Fountains	5
Hydrants	1,661
Sill cocks and street washers	354
Miscellaneous	270

All of which have had careful inspection, with the following result:

Number of premises inspected	1,937
Number of leaks discovered	165
Number of notices served on water consumers for violation of rules	311
Notices to plumbers and drain layers	65
Number of inspections made	2,641
Number services cut off	164
Number services cut on	87

The following table shows the number, kind and location of water fixtures, (not metered:)

WARDS.	Ватнѕ.	CLOSETS.	WASH BASINS.	Sinks.	URINALS.	FOUNTAINS.	Hydrants.	St. Washers and Sill Cocks.	MISCELLANEOUS.
First	9	102	9	119	11	0	128	81	20
Second	48	307	42	164	11	3	244	56	17
Third	136	608	109	314	7	2	516	163	107
Fourth and Fifth	36	199	23	187	7	0	465	49	87
Sixth and Seventh	7	65	7	52	11	0	139	19	24
Eighth	20	119	19	99	6	0	145	29	30
School and engine houses	6	20	81	89	20	0	24	7	35
Total	260	1420	240	974	78	5	1661	354	270

Respectfully submitted,

A. PER LEE,
Inspector.



City Surveyor's Report.

OFFICE OF CITY SURVEYOR, GRAND RAPIDS, MICH., May 1, 1888.

To the Honorable Board of Public Works:

GENTLEMEN—I have the honor to submit herewith a report of work completed under your direction during the year ending April 30, 1888.

STREETS.

Grade lines have been approved and adopted for 71,927 feet, or 13.62 miles of streets, as per the following table:

LIST OF STREETS ON WHICH GRADE LINES HAVE BEEN ESTABLISHED DURING THE PAST YEAR.

STREETS AND AVENUES.	FROM	то	LENGTH IN FRET.
Eleventh avenue	South Division street	West	2,100
Twelfth avenue	1	West	2,180
South Ionia street	Hall street	Seventh avenue	1,981
East street	Lake avenue	Hall street	7,098
North Division street	Crescent avenue	East Bridge street	524
Ottawa street	Crescent avenue	East Bridge street	524
East Park Place	Park street	East Fulton street	871
Forrest street	Page street	Madison avenue	588
Rumsey street	Hilton street	Grandville avenue	694
Webster street	North Front street	West	2,020
Fairbanks street	Clinton street	West	218
Sherman street	East street	South Union street	1,24
Mills street	Madison avenue	South Union street	1,250
Terrace avenue	Fifth avenue	Highland avenue	1,757
Highland avenue	Jefferson avenue	South Union street	2,627
Williams street	Ellsworth avenue	South Waterloo street	743
Pleasant street	Madison avenue	South Lafayette street	648
Curtis street	North avenue	North Union street	1,258
King Court	Plainfield avenue	Henrietta street	440
North Prospect street	Hastings street	Fairbanks street	1,06
Crosby street	Alpine avenue	West street	2,567
North Coit avenue	Plainfield avenue	Sweet street	1,06
Calder street	East Fulton street	Cherry street	1,24
Eleventh street	North Front street	Alpine avenue	8,200
Goodrich street	South Division street	Jefferson avenue	910
Quimby street	Taylor street	North College avenue	3,09
McDowell street	South Division street	Jefferson avenue	874
Eighth avenue	South Division street	Buchanan street	1,25
Seventh avenue	South Division street	Buchanan street	1,25
Livingston street	East Bridge street	Fairbanks street	1,63
Grove Court	Plainfield avenue	Henrietta street	32
Munson street	Center street	Jefferson avenue	40

LIST OF STREETS ON WHICH GRADE LINES HAVE BEEN ESTABLISHED DURING THE PAST YEAR—CONTINUED.

STREETS AND AVENUES.	FROM	то	LENGTH IN FEET.
Wealthy avenue	South Division street	Madison avenue	2,274
Carpenter street	Second avenue	North	887
Fifth avenue	East street	Madison avenue	2,561
Hall street	East street	Grandville avenue	8,907
Thomas street	East street	Henry street	* 591
East Leonard street	East street	Grand River	5,841
Newberry street	Clinton street	Coit avenue	700
Colfax street	North Coit avenue	Taylor street	1.050
Sweet street	North Coit avenue	Taylor street	1,050
Queen street	Sweet street	Quimby street	824
Buckeye street	Henry street	South Union street	594

The following table shows the street improvements brought to completion during the year, together with the character and cost thereof:

ST	STREET IMPR	IMPROVEMENTS	COMPLETED DURING THE	YEAR	ENDING		APRIL 30	30, 18	1888.
NAMES OF STREETS AND AVENUES.	FROM	TO	KIND OF IMPROVEMENT.	Генстн и Гент.	Сом- тилст Ряісв.	ESTI- INCIDEN- TALS.	Total Cost.	Рек Гоот.,	NAME OF CONTRACTOR.
Ellsworth avenue	E. Fulton-st	Bartlett-st	Graded, graveled and gutters paved	1,954	89,720 00	\$310 00	\$10,030 00	\$5 15	A. Rens
South Lafayette street	Fifth-av	Hall-st.	Graded, graveled and gutters paved	2,582	4,240 00	980 00	00 009.7	1 78	P. J. Britton
Fifth avenue	Madison-av	Grandville-av	Graded, graveled and gutters paved	5,159	9,100 00	00 08	9,580 00	1 88	C. Utes
North Pine street	W. Bridge-st	Fourth-st	Graded and graveled	1,517	2,800 00	100 00	2,900 00	1 91	I. B. Mathewson
South Lane avenue	W. Bridge-st	Sibley-st	Graded and graveled	1,252	970 00	100 00	1,070 00	2	J. Kloote
North avenue	E. Bridge-st	Trowbridge-st	Graded, graveled and gutters paved	1,255	2,383 00	137 00	2,530 00	2 00	C. Prange
Perry street	Page-st	Quimby-st	Graded, graveled and gutters paved	1,027	1,885 00	105 00	2,000 00	1 8	R. Pickett
Earle street	S. Front-st	Straight-st	Graded	1,388	00 089	20	240 00	23	F. Schneider
West Broadway street	Butterworth-av	Earle-st	Graded	212	150 00	80	180 00	88	B. Livingstone
South Division street .	Fulton-st	Wealthy-av	Repaved with wood, stone curb	2,585	9,735 00	2H5 00	10,000 00	88	Mathewson & Kloote
South Division street .	Wealthy-av	Hall-st	Paved with wood, stone curb	5,215	18,952 00	268 00	19,520 00	8 74	Mathewson & Kloote
North Division street.	Monroc-st	Fulton-st	Repaved with wood, stone curb	55	824 00	26 00	880 00	3 92	Mathewson & Kloote
North Division street.	E. Bridge-st	Crescent-av	Graded, graveled and gutters paved, \ stone curb	221	1.329 06	111 00	1,440 00	2 74	F. Childs
Beech avenue	Third-st	Fourth-st	Graded, graveled and gutters paved	S	436 00	24 00	230 00	1 60	J. Hyland
Second avenue	Grandville-av .	Oakland-av	Graded, graveled and gutters paved	912	5,208 00	122 00	5,330 00	5 80	C. Utes
Hastings street	Canal-st	Ottawa-st	Graded, graveled and gutters paved	909	1,193 00	107 00	1,300 00	2 57	C. Prange
Julia street	N. Union-st	Grand-av	Graded, graveled and gutters paved	210	700 00	100 00	00 008	1 57	J. Collins
Eighth street	N. Front-st	Broadway-st	Graded, graveled and gutters paved	883	1.457 00	103 00	00 1,560 00	1 87	R. Pickett
		,							

S. Ionin-st Buchanan-st. Graded, graveled and gutters paved. 371 890 00 \$100 00	filler street			KIND OF IMPROVEMENT.	LENGTH IN FRET.	Сом- тилст Репси.	ESTI- TALS, TALS,	TOTAL COST.	Рек Foor.	NAME OF CONTRACTOR.
Lyon-st E. Bridge-st. Graded and paved with wood, stone curb 1,074 5,070 00 150 00		S. Ionia-st Park-st	Buchanan-st E. Fulton-st	Graded, graveled and gutters paved				300 00	\$1.18 2.64 46	Kloote F. C. Schneider
N. Front-st C.& W.M.R.R. Graded, graveled and gutters paved 1,974 4,485 00 205 00 Eith-av Hall-st Graded, graveled and gutters paved 2,573 8,950 00 200 00			E. Bridge-st		4	5,070 00 1,580 00	150 00	5,220 00	2 4 8 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	C. Prange J. DeBruin
	Vebster street	N. Front-st				4,485 00 3,950 00	205 00	4,690 00	2 32 1 61	H. Wagemaker Mathewson & Kloote
Ransom-st Barclay-st Graded, graveled and gutters paved 545 00	East Bridge street, \ where widened \ Shawmut avenue			Graded, graveled and gutters paved Graded, graveled and gutters paved		545 00		545 00 6.800 00	. 22	L. Schneider

In the foregoing tables there is shown 39,823 linear feet of street improvements, of which:

Were graded	2,248 feet.
Were graded and graveled	2,767 feet.
Were graded and graveled, with paved gutters	25,777 feet.
Were graded and paved with cedar blocks	0.031 feet.

There was used in the above noted improvements, 20,941 feet of Medina, New York, curb stone.

The total cost of the improvements was \$99,585.

The total number of miles of streets in the city is 143.012, of which there are:

Graded and paved with wood and stone	6.114 miles.
Graded and paved with wood	1.388 miles.
Graded and paved with stone	1.178 miles.
Graded, graveled and gutters paved	43.367 miles.
Graded and graveled	32.195 miles.
Graded	3.000 miles.
Unimproved	55.770 miles.

143.012 miles.

SEWERS.

The following table shows length, size, kind, location and cost of sewers constructed:

	NAME OF CONTRACTOR.	Schneider & Wagemaker	Schneider & Wagemaker	Schneider & Wagemaker	C. Utes	J. McDermott	Mathewson & Kloote	J. Collins	Schneider &	J. Collins	J. Collins	J. DeBruin	
	Total Cost.	\$3,380 00	1,758 80	1,860 00	1,270 00	460 00	00 079	3,650 00	200 00	2,600 00	2.630 00	2,060 00	
1888.	Езтіматвр Іисірвитагэ.	. 00 082\$	158 80	140 00	100 00	88	108 00	900 00	00 06	225 00	rock, etc 670 00	370 00	
RIL 30	CONTRACT PRICE.	\$3.130 00 \$230 00	1,600 00	1,720 00	1,170 00	377 00	282 00	3,350 00	410 00	2.375 00	1,980 00	1,690 00 870 00	
NG AI	Гемстн ім Ревт.	288 288 288 288 288 288 288 288 288 288	{ \$16 } { 750 }	₹ 282 742 742	388 388 388 388 388 388	300	90,	8 13 { 1061 }	288	≥ 828 5 818	~	282 283 283 283 283 283 283 283 283 283	
	Man-holes.	9	*	· :	2/	:	: 20	8 13	1 2	90	2	:	
THE YEAR ENDING APRIL 30, 1888.	SIZE AND KIND.	(20x30 egg shape,) brick. 12 inch glazed pipe (9 inch glazed pipe)	{ 12 inch glazed pipe }) 12 inch glazed pipe }	12 inch glazed pipe ?	9 inch glazed pipe	9 inch glazed pipe	{ 12 inch glazed pipe { 9 inch glazed pipe }	9 inch glazed pipe	12 inch glazed pipe (18x27 inch, brick . 16x24 inch, brick . 9 inch glazed pipe	===	
SEWERS COMPLETED DURING	LOCATION.	From w. line Union street, in E. Fulton street, estarfy to Packard street, thence south to Cherry street, thence west to point 60 feet N. of S. Union street	From Eighth street to Eleventh street	From n. line Scribner & Turner's add. to Fourth-st.	From s. line Sixth street to Fourth street	From 75 feet n. of W. Bridge street to First street.	From point 100 feet north of Fountain street to (From 50 feet w. of East street to Morris avenue and from thence north to sewer across private property	From s. line of Crosby street to W. Leonard street	From n. line Munson street to Fifth avenue	From Alpine avenue to point 47 feet w. of G. t.	From 20 feet c. of C. & W. M. R. R. to N. Front-st	
	NAME OF STREETS AND AVENUES.	Lake avenue, Packard and Cherry streets }	Scribner street	Scribner street	Turner street	Turner street	North College avenue	Wealthy and Morris avenues	Hamilton street	Center street	Eleventh street	Eleventh street	

CONTRACT PRICE. CONTRACT PRICE. CONTRACTOR. CONTRACTOR. LESTIMATED LICIDENTALIA 13 \$ 554 00 \$ 420 00 C. Prange. 529 440 00 70 00 470 00 J. Collins. 530 347 04 72 96 420 00 F. Childs.
CONTRACTOR OF THE CONTRACTOR O
LEYGTH IN FEET IN FEET
NAMES OF STREETS LOCATION. SIZE AND KIND. Colored Ann Avenues. Size and Kind. Size and Ki

The table of sewer construction shows an addition of 2,983 feet of brick sewers, and 13,614 feet of tile sewers, to the system of sewerage.

Of the 42,669 miles of sewers constructed, there are:

Brick sewers	17.486 miles.
Glazed pipe sewers	22.690 miles.
Cement sewers	.480 miles.
Wood sewers	1.853 miles.
Iron pipe in river	.160 miles.

In the work noted above, there was constructed 47 man-holes, and 43 catch-basins.

The cost of the work was \$22,463.80.

BRIDGES.

On September 7, 1887, bids were opened for the construction of a plate girder bridge of 62 feet clear span, to be placed over the east side canal, at Bridge street. The bridge to be 66 feet in extreme width, roadway 42 feet, and two 12-feet sidewalks. The contract was awarded to the Massillon Bridge Company, of Massillon, Ohio, for \$7,000. The bridge is not yet erected.

On the foundations for the bridge there has been expended \$2,100. This work is not quite completed.

WATER MAINS.

With but two exceptions, all pipe-laying has been substituting iron pipe for pump logs and Wyckoff pipe that had become too much decayed and leaky to be of further use.

The following table shows where pipe was laid, size, length, et cætera:

STREET.	FROM	то	DIAMETER IN INCHES.	LENGTH IN FEET.	NEW HYDR'T	NEW VALVES	REMARKS.
Broadway	West Bridge	Eighth	12	2914	ļ	1	Wyck'ff pipe rem'd
Crescent	N. Lafayette	N. College	6	1316		1	Pump log removed.
N. Prospect	Lyon	Near Fulton	6	1263			Pump log removed.
Fountain	N. Lafayette	Grand avenue.	6	2588		1	Pump log removed.
Sou. Division.	Monroe	Wealthy	12	2808	 		Wyck'ff pipe rem'd
Sou. Division.	Seventh	Hall	8	1990	6	2	New Line
North Canal	Coldbrook	N. City Line	(12) (8)	(814) (2602)	; 	1	Wyck'ff pipe rem'd
East Leonard.	North Canal	North Ionia	12	331			Wyck'ff pipe rem'd
Monroe	N. Division	East	8	98			New Line

The total cost of the above work was...... \$27,492 84

In all cases wherever pipe is relaid, the Lowry hydrants are removed, and post hydrants substituted therefor.

A cistern or reservoir of brick was constructed in North avenue, near Fernando street, having a capacity of 580 barrels. This cistern is supplied from a storm water creek. The work was done by John DeBruin for \$368, on a contract awarded June 4, 1887.

To meet any emergency that might arise in times of a deficiency in the supply of water from the supply creeks, a connection was made with the river in rear of the pumping station. Plans for the work were prepared by Mr. J. D. Cook, C. E., of Toledo, Ohio. The plant is an influent chamber excavated in bed rock to a depth of about five feet, in mid-channel in the river. In the excavation was constructed a crib work, 6 x 8 feet square in inside dimensions of 6 x 12 inch timbers, spaced one-half inch apart for the admission of water; the top being covered with plank. The space outside of the crib work was filled with screened gravel, through which the water must pass to enter the chamber. On shore was constructed a pump well of brick work, elliptic in plan, 8 x 12 feet in inside dimensions. The chamber and well are connected by three lines of 12 inch pipe. A connection between one of the pumps and pump well was made by a 20-inch suction pipe.

For the construction of the work a contract was awarded to Joel Collins, August 13, 1887, for \$3,400. He to do all the work, and furnish all material, excepting the influent and suction pipes.

The total cost of the work was \$4,384.28.

CITY HALL.

Excepting the doors, the structure is substantially completed.

A contract for grading and soiling the grounds around the city hall was awarded September 10, 1887, to C. Prange, for \$583. This work was the excavating to a point fourteen inches below the finish or grade of the lot, and putting over the whole surface one foot of good soil upon which to lay the turf, and making provision for properly draining the grounds.

The walks and coping around the city hall were put in position by Alex. Matheson, on a contract awarded August 10, 1887, for \$10,240.86.

The coping is of Berea sand stone, and the walks are Lemont, Illinois, lime stone. Street walks are 14 feet wide, and 6 inches in thickness; entrance walks are 4 inches thick, all resting upon masonry foundations, and have top surface planed smooth.

The work of sodding the grounds was done by Wesselius & Spoelstra, for \$154 92.

HOSPITAL FOR CONTAGIOUS DISEASES.

Plans for the hospital were prepared by W. G. Robinson, architect. The structure is of brick, having a basement containing living and dining rooms, two chambers, store room and cistern, and is 9 feet in height. The first story is 12 feet high, is divided into six wards 12½ and 15 feet by 15½ feet; also two nurses rooms and bath room, with hall extending entire length of building. Above this story is a high attic. The structure is 40 by 54½ feet in plan.

The contract for constructing the building was awarded September 24, 1887, to Joel Collins, for \$3,535.

ENGINE HOUSE NO. 3.

Engine house No. 3 is located at the southwest corner of North Front and Second streets. Has a width of 66 feet, and is 86 feet deep, and is constructed of brick.

The structure is built after plans prepared by W. G. Robinson, architect, on a contract awarded April 27, 1887, to Collins, Blakesly & Blakesly, for \$9,990.

The building contains on first floor, an office, apparatus rooms and stable, and above is the dormitory and hay loft. Is provided with bath, closets, and all necessary arrangements.

RECAPITULATION.

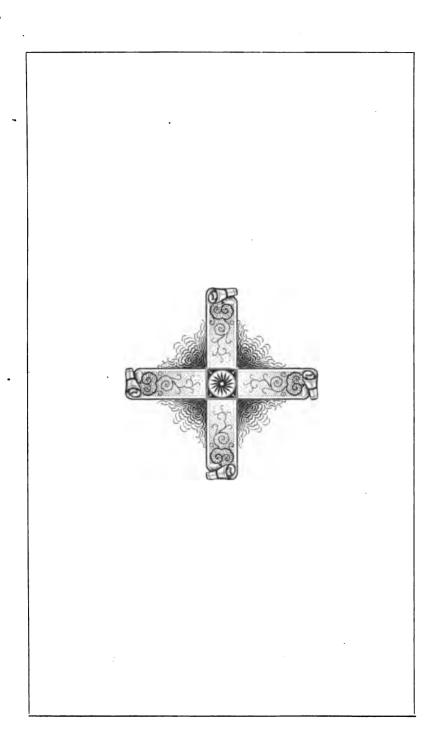
Street improvements	\$ 99,586 00
Sewerage	22,463 80
City hall grounds, walks, et cætera	10,978 78
Hospital	3,535 00
Engine House No. 3	9,990 00
Water works	31,877 12
Reservoir in North avenue	368 oo
Total	
been:	
For salaries	\$ 4,301 73
For sundry expenses	74 99
Total	\$ 4,376 72

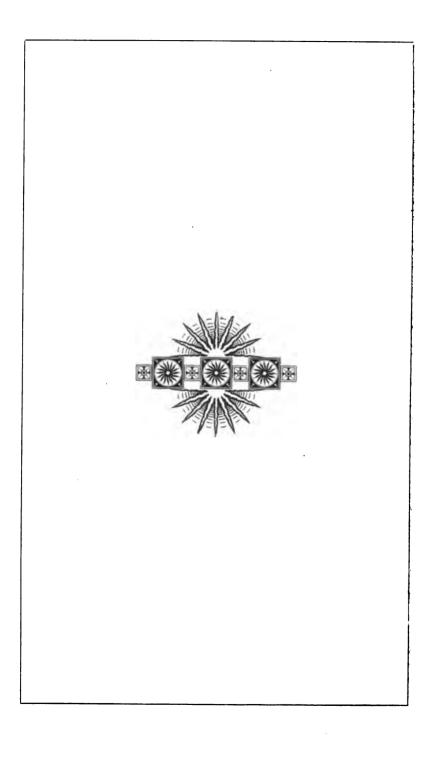
Respectfully submitted,

H. A. Collar,

City Engineer.







Sixteenth Annual Report

-OF THE-

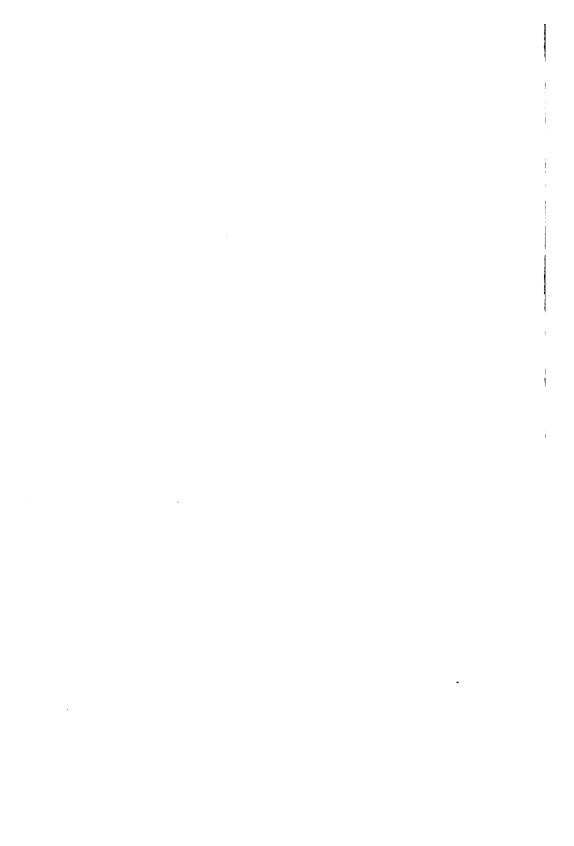
BOARD OF PUBLIC WORKS

OF THE CITY OF

Grand Rapids, Michigan.

For the Fiscal Year Ending April 30, 1889.

GRAND RAPIDS, MICH.: THE DEAN PRINTING & PUBLISHING COMPANY. 1889.



ANNUAL REPORT

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BOARD OF PUBLIC WORKS

-TO THE-

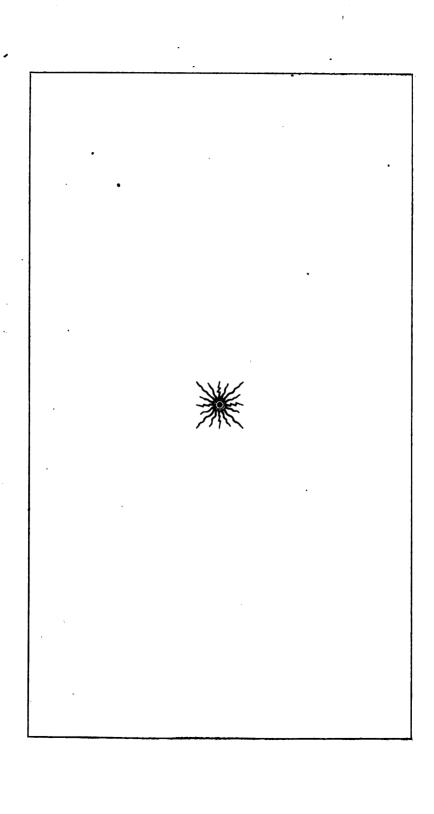
Common Council of the City of Grand Rapids,

TRANSMITTING THE REPORTS OF

THE COLLECTOR, CITY ENGINEER, ENGINEER OF PUMPING WORKS, AND INSPECTOR OF WATER WASTE.

THE FISCAL YEAR ENDING APRIL 30, 1889.

GRAND RAPIDS, MICH.: THE DEAN PRINTING & PUBLISHING COMPANY. 1889.



BOARD OF PUBLIC WORKS.

GEORGE G. BRIGGS, PRES'T Term expires May, 1890
JOHN KILLEAN, MAYORTerm expires May, 1890
JOHN S. FARR Term expires May, 1890
W. R. SHELBY Term expires May, 1891
FREEMAN GODFREYTerm expires May, 1891
JAMES N. DAVISTerm expires May, 1892

OFFICERS.

H. A. CollarCity Engineer
FRED. A. TWAMLEY
THOMAS J. WILLARDAssistant Collector
GEORGE E. KIRKEngineer of Pumping Works
JOHN VAN AMBERGForeman
A. Per LeeInspector

REPORT OF THE BOARD.

GRAND RAPIDS, MICH., August 10, 1889.

To the Honorable Mayer and Common Council of the City of Grand Rapids:

Gentlemen—The Board of Public Works has the honor to herewith transmit, for the consideration of your honorable body, their Annual Report for the year ending April 30, 1889. Accompanying same will be found the reports of the City Engineer, Collector of Water Rates, Engineer of Pumping Works and the Inspector of Water Waste.

The reports above named give in detail full information concerning the operations of the several departments during the year just closed.

CITY ENGINEER.

The mileage of streets has been increased by platting and street openings 5 45-100 miles, making the total miles of streets on the 30th day of April, 1889, 148 462-1000 miles.

The number of miles of improved streets has been increased by 31,218 lineal feet, making the aggregate of improved streets 92 308-1000 miles.

Twenty-three thousand four hundred and forty-two lineal feet of sewers have been constructed, making a total of 42 127-1000 miles now in use. In connection with the sewers 67 manholes and 48 catch-basins were built.

The iron bridge over the East side canal at Bridge street, together with stone abutment, cost \$9,305.58. Repairs on

Bridge street bridge were made at an expense of \$3,037.15, which constitutes the work in that department of the Board.

Twenty and four-tenths miles of iron water mains have been laid, making a total on the 1st day of May last of 48 4-10 miles.

Two hundred and thirty fire hydrants have been added to the fire system, making a total of 526.

Number of valves now in use 358, an increase of 165.

The improvements at the pumping station are as follows:

Replacing the north pump with a new one of increased capac-

ity, with connections and valve motion	\$7,298	99
Pump for high service and connections	2,451	85
Brick annex for pump and pump foundation	1,200	78
Additional boiler and connections	5,489	21
Enlarging boiler house and coal shed	1,706	84
Total	\$18,147	67

CITY HALL.

The building was completed and final payment made August 25, 1888. Dedication and acceptancy by the city authorities September 26 following.

TOTAL EXPENDITURES.

Street improvements	\$82,200 00
Sewers	38,900 00
Bridges and repairs	12,342 73

Water works construction:

Extension of mains and replacing Wyckoff pipe	157,541	64
Completion of city hall	19,412	10
Improvements at pumping station	18,147	67
River crib and intake	2,714	92
Site for stand pipe	576	00
New meters and setting	727	90

Total expenditures during year\$332,562 96

COLLECTOR OF WATER RATES.

• • • • • • • • • • • • • • • • • • • •		
Income from water rates	\$41,838	66
Cost of maintenance	22,084	44
NI	#10 PP 4	

Whole number of water services now in use 2, 156, being an increase of 241.

Receipts from water rates show a slight increase over last year, notwithstanding there were two reductions in rates for metered water.

Revenues from new services did not commence until about the close of the year.

If this department was credited with the average amount allowed by cities of equal population of Grand Rapids for fire protection and public use, the water system would be more than self-sustaining.

ENGINEER OF PUMPING WORKS.

Number of gallons pumped
Average daily consumption
Cost of pumping 1,000,000 gallons
Being a slight increase over last year, owing to the high
service pump running against a water pressure of 90 pounds
instead of 65 pounds, and increased labor at pump house.

For the past few months coal has been substituted for wood as fuel, and the results show that the former is more economical.

WATER WASTE INSPECTOR.

This report shows that there are now in use for baths, closets, wash basins, sinks, urinals, street sprinklers, etc., 6,159 fixtures, and that equal care is taken to protect the rights of citizens and the city at large.

The several reports close with the year ending April 30, 1889. Since that date provision has been made for increased water supply and better service. Ground has been purchased, and a stand pipe is in process of construction thereon for more efficient and permanent service, on the high level. The size of the main distributing pipes have been increased and extended, new and improved machinery

has been added, and a filtering bed, 50 x 400 feet, is being built in the river, according to the plans adopted in large cities supplied in like manner to Grand Rapids, which it is believed will furnish 10,000,000 gallons every 24 hours.

We are, very respectfully,

GEORGE G. BRIGGS,
FREEMAN GODFREY,
JOHN S. FARR,
JAMES N. DAVIS,
W. R. SHELBY.

Board of Public Works

COLLECTOR'S REPORT.

Office Board of Public Works, } Grand Rapids, Michigan, May 1, 1889. \$

To the Honorable Board of Public Works:

GENTLEMEN—I respectfully submit to your	honorable
body the following report for the year ending Apr	il 30, 1889:
The number of services connected with the city's works on the 1st of May, 1888, for which permits were issued,	
were	1,817
Special taps granted	27
Private mains connected with works	61
Total	1,905
Number of services put in the past year, for which permits	
were issued	663
Total number of connections on May 1, 1889	2,568
Number of services now cut off	412
Number of services now open	2,156
The receipts for the year have been as follows	S:
From water rates, fines, etc	\$40,179 66
From water permits	1,659 00
Total income from water works	\$41,838 66
Miscellaneous receipts	1,801 88
Total receipts for the year	\$43,640 54
Cash on hand May 1, 1888	• 851 65
Total	\$44,492 19

Deposits have been made with the City Treas	urer duri	ng
the year as follows:		
To the credit of the water works income fund	\$40,857	14
To the credit of general fund	10	00
To the credit of water works fund	1,791	88
Total deposits during the year	\$42,659	02
Cash on hand to balance	1,833	17
Total	\$44,492	19
Receipts from May 1, 1874, the commencem	ent of c	ol-
lections, to May 1, 1888:		
From water rates, fines, etc	\$274,367	17
From water permits	10,320	98
From various sources (per past reports)	4,699	13
Total	\$289,387	28
Receipts for the past year	43,640	54
Total receipts to date	\$333,027	82
Deposits made from May, 1874, to May 1, 18	88 :	
To the credit of the water works ncome fund	\$284,774	01
To the credit of various funds (per past reports'	3,761	62
Total	\$288,535	63
Deposits made the past year	42,659	02
Cash on hand to balance	1,833	17

Total......\$333,027 82

STATEMENT OF EXPENDITURES.

MAY 1, 1888, TO MAY 1, 1889.

CONSTRUCTION OF WATER WORKS.

1-PIPE SYSTEM.

Relaying of mains	\$7,109	96
Extension of mains	146,339	75
Force main for high service	4,091	93
·	\$157,541	64
2—Pumping Machinery, Low Service.		
New pump, its connections and valve motion	\$7,298	99
New boiler and connections	5,489	21
·	\$12,788	20
3—River Connection.		
River crib and intake	\$2,674	91
First river connection	40	01
· · · · · · · · · · · · · · · · · · ·	\$2,714	92
4—Buildings.		
Enlarging wood shed and boiler house	\$1,706	84
5-Pumping Machinery, Etc., High Service.	•	
Hill service pump and connections	\$2,451	85
Annex and pump foundation	1,200	78
Site for stand pipe	576	00
6-Meters.	\$4,228	6,3
New meters and setting	\$727	90
Total paid on construction	\$179,708	13
Paid previous to May 1, 1888	536,177	
Cost of works to date	\$715,885	52
Five hundred and thirty-two thousand dollar	ars of the	his
amount is represented by outstanding bonds of th	e city	

MAINTENANCE AND OPERATION OF WATER WORKS.

1-Pumping.

\$1,200	00
900	00
631	09
600	00
600	00
393	22
7,684	36
92	94
635	24
17	15
\$12,754	00
\$337	56
600	00
242	66
166	
71	63
\$1,417	85
- 050	
1,950	00
1,830	00
1,830	00
·	
474	
·	
·	
·	73
474	73
474	73
474	73
474	73 82
474 1,208	73 82
474 1,208	73 82
474 1,208	73 82
	\$12,754 \$337 600 393 7,684 92 635 17 \$12,754 \$337 600 242 166 71

THE BOARD OF PUBLIC W	orks.			13
5-Meters.				
Labors (reading meters, etc.)	\$652	39		
Material	135			
6—RIVER SUPPLY.			787	73
Labor			130	03
7—Reservoir.				
Labor (cleaning)	\$293	70	•	
Material	-	70		
8—Settling Basin.			346	40
Labor	\$31	50		
Material	-	78		
		_	41	28
Labor			258	50
10—Service Connection				
Labor	\$465	38		
Material	583		1,049	24
11Miscellaneous.			1,048	34
Tools, oils and supplies	\$ 419	09		
Blowing off	13	75		
Barn, horse, wagon, etc	290	40		
Shop and storehouse	133	30		
Rent of telephone at foreman's residence	40	00	896	54
Total			\$7,912	
DECARITY ATION				
RECAPITULATION. Pumping			\$12,754	00
Office and collecting			1,417	
Repairs and inspection			7,912	
Total paid for maintenance and operation			\$22,084	44
Income for the year		=	41,838	66
Cost of maintenance and operation		• • •	22,084	44
Excess of receipts over expenditures		_	\$19,754	00

METERS.

Of the 492 meters last reported 71 of them have been found unfit for further service and are not accounted for. The balance, with the 50 meters purchased during the year, make 471 meters owned by the city, as follows:

NAMES OF METERS.	Running	In Shop	Тотац
Ball & Fitts Rotary	75	24	99
Worthington	200	11	211
Crown	67	28	90
Ball & Fitts Piston	27	5	32
Duplex	25	14	39
Total	394	77	471

Sixty-four leaks on mains have been repaired; of these 50 were on Wyckoff pipe and 14 on iron pipe.

The total length of water mains now laid is 48.4 miles.

Number of hydrants	526
Number of valves	358

Respectfully submitted,

FRED A. TWAMLEY,

Clerk and Collector.

ENGINEER OF PUMPING WORKS' . EPORT.

To the Honorable Board of Public Works:

GENTLEMEN—I have the honor to submit the engineer's report for the year ending May 1, 1889.

The following table shows the number of days run for each month, number of revolutions made, number of gallons of water pumped, amount of wood and coal burned, and the cost of the same:

MONTH.	DAYS.	TOTAL TIME RUN.	NUMBER OF REVOLUTIONS	GALLONS OF WATER PUMPED.	CORDS OF WOOD.	Cost of Wood.	Pounds of Coal.	Cost of Coal.
May	81	798:20	788,500	78,850,000	305¾	5 515 65		
June	80	855:20	875,944	87,594,400	861	618 70		
July	31	909:25	962,607	96,260,700	407	691 90	 	ļ
August	31	1000:30	1,114,586	91,121,400	469	797 80		
September	80	1253:10	1,329,836	93,217,900	452	768 40	 	
Oetober	81	1290:00	1,269,537	92, 195, 320	418	793 60		
November	80	1208:05	1,214,582	77,645,600	424	848 84		
December	81	1124:85	1,890,127	74,442,860	841	692 57	104,014	184 62
January	31	1148:15	1,887,018	75,499,220	199	404 00	251,785	421 66
February	28	1164:00	1,320,827	75,315,710	140	284 20	255,080	407 80
March	81	1202:15	1,848,455	75,646,200			484,698	727 56
April	80	1168:20	1,145,647	78,819,400			893,295	665 57
Totals	865	18117:15	14,142,561	991,608,710	3516¾	\$6410 16	1,438,817	\$2406 71

The average daily consumption of water for the year has been 2,716,736 gallons.

This somewhat exceeds the cost of pumping of last year, which is due to the hill pump running against a water pressure of 90 pounds instead of 65 pounds.

The running expenses for the year have been:

For repairs on engines and boiler	\$186	91
For packing, oil, waste and lights	481	66
For fuel consumed	8,816	87
For salaries of engineers and firemen	4,338	46
Total	\$13,823	90

Inventories of stock and tools on hand at pump house May 1, 1889:

Respectfully submitted,

GEORGE E. KIRK,

Engineer of Pumping Works.

INSPECTOR'S REPORT.

OFFICE BOARD OF PUBLIC WORKS, GRAND RAPIDS, MICHIGAN, May 1, 1889.

To the Honorable Board of Public Works:

Gentlemen—I respectfully submit the following report for the year ending April 30, 1889:

Total number of premises supplied with city water (not metered). 2,348

Total number of fixtures 6, 159, as follows:

Baths 320
Closets
Wash basins
Sink faucets
Urinals 78
Hydrants, street washers and sillcocks
Miscellaneous
Which have been carefully inspected, with the following result:
Number premises inspected
Number of leaks discovered
Number of notices on water consumers for violation of rules 133
Notices to plumbers and drain layers 96
Number of inspections made
Number of services shut off
Number of services turned on 109

The following table shows the number, kind and location of water fixtures:

WARDS.	Ватиѕ.	CLOSETS.	Washbasins	SINKS.	URINALS.	HYDRANTS, SILLCOCKS AND ST. WASHERS.	MISCRILA-
First	20	109	15	105	18	242	21
Second	43	274	38	131	12	227	28
Third.	173	752	148	397	8	914	135
Fourth and Fifth	44	237	23	198	8	510	36
Sixth and Seventh	10	128	8	82	10	287	20
Eighth	25	181	23	118	7	243	20
School and Engine houses	5	11	28	53	20	40	37
Total	320	1642	278	1081	78	2463	297
Grand Total					!		6159

There are also 44 private fire protection lines connected with the manufacturing houses in the city.

The metered services have a monthly reading, and when there is excessive use (or waste) the premises are carefully inspected and the owner notified of the result of the inspection.

Respectfully submitted,

A. PER LEE,

Inspector.

CITY ENGINEER'S REPORT.

OFFICE BOARD OF PUBLIC WORKS, I GRAND RAPIDS, MICHIGAN, May 1, 1889.

To the Honorable Board of Public Works:

Gentlemen—I have the honor to submit herewith a report of the work brought to completion during the year ending April 30, 1889.

STREETS.

Eight and fifty-four one hundredths miles of streets have had grade lines approved and adopted, as per the following list:

STREETS AND AVENUES.	FROM	то	Length in Feet.
Davis street		North street	2,579
Godfrey avenue	Fifth avenue	South Waterloo street	2,070
Coit avenue	East Bridge	Fairbanks street	1,700
Ninth avenue	Wallen street	M. C. R. R	211
Christ street	Carrier street	Curtis street	600
Madison street	North avenue	North Union street	1,258
Marietta street	North avenue	North Union street	1,260
Fernando street	North avenue	North College	597
North Union street	East Leonard street	Sweet street	2,616
Lyon street	North Division street	North Union street	3,629
Broadway street	Seventh street	North street	5,183
Shepard street	West Fulton street	Butterworth avenue	1,882
North Forrest street	Quimby street	Sweet street	820
Tenth street	Alpine avenue	Tamarac street	1,267

STREETS AND AVENUES.	FROM	то	LENGTH IN FERT.
Third street	Stocking street	Lincoln street	2,586
Chestnut street	Grandville avenue	Oakland avenue	499
Laurel street	Grandville avenue	Oakland avenue	371
Fourth avenue	Grandville avenue	Oakland avenue	619
Lincoln street	Fourth street	Walker avenue	2,07
Benson street	Crescent avenue	East Bridge street	39
Taylor street	East Leonard street	Sweet street	2,59
Taylor street	Coldbrook street	Walbridge street	673
Crescent avenue	North Union street	Grand avenue	60:
West Leonard	The bridge	West street	3,650
North Lane avenue	West Bridge street	Fourth street	1,52
Dexter Place	East Bridge street	Fairbanks street	1,68
Logan street	South Union street	Henry street	594
Morris avenue	Cherry street	Wealthy avenue	1,25
Campbell Place	Lyon street	South	36

	_	_
THE FOLLOWING TABLE SHOWS THE STREET IMPROVEMENTS BROUGHT TO COMPLETION DURING THE YEAR ENDING APRIL 30, 1889,		
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OVEMENTS BROUGHT TO COMPLETION DURING THE YEAR ENDING APRIL 30,		OCETHER WITH THE CHARACIER AND COST THERE
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THE FOLLOWING TABLE SHOWS THE STREET IMPRO		
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TOTAL NAME OF AMOUNT. CONTRACTOR	\$4,750 00 P. J. Britton 9,360 00 Tennis & Hembling	8,570 00 R. Pickett 2,630 00 Mathewson	2,120 00 Mathewson & Kloote 1,500 00 L. Schneider	2,600 00 C. Prange	107 00 1,670 00 C. Prange	300 00 5,300 00 B. Livingston	00 1,090 00 L. Schneider	· •	147 00 3,640 00 C. Prange	125 00 · 1,550 00 · R. Pickett
ESTI- MATED INCI- DENTALS.	\$100 00 \$	270 00	120 00		107 00	300 000	95 00	74 16	160 00	125 00
CONTRACT	\$4,650 00	8,300 00	2,000 00	2,450 00	1,563 00	5,000 00 2,105 00	995 00	က်	3,493 00	1,425 00
KIND OF IMPROVEMENT.	Butterworth avenue Jackson street Graded and graveled	Cherry street Hall street Graded, graveled and gutters paved	Graded, graveled and gutters paved	Graded, graveled and gutters paved	S. waterloo street Graded, graveted and gutters paved	Graded, graveled and gutters paved	Chatham street Graded, graveled and gutters paved	Carrier street Quimby street Graded, graveled and gutters paved	Regraded, graveled and gutters paved, stone curb. Graded, graveled and gutters paved	Forrest street Page street Madison street Graded, graveled and gutters paved
OL	Jackson street	Cherry street Hall street	N. Union street E. Bridge street Lyon street	Taylor street	S. waterioo street Buchanan street	Alpine avenue	Chatham street	Quimby street		Madison street
FROM			E. Bridge street S. Division street		S. Ionia street	N. Front street	W. Bridge street	Carrier street	Lyon street F. Bridge stree Seventh avenue Hall street	Page street
NAME OF STREET.	Indiana street.	East street	N. Union street	Colfax street	Wealthy avenue	Eleventh street N. Jefferson street	S. Jefferson street	Reed street	Bostwick street	Forrest street

NAME OF STREET.	FROM	10	KIND OF IMPROVEMENT.	CONTRACT PRICE.	ESTI- MATED INCI- DENTALS.	Тотав.	NAME OF CONTRACTOR.
Syramore street S. Lyon street Ca	S. Division street Canal street	S. Lafayette street	S. Division street S. Lafayette street Graded, graveled and gutters paved	2,190 00	140 00	2,330 00	2,330 00 J. De Bruen 5,640 00 L. Schneider
Marion street W. Buckeye street S.	W. Bridge street	W. Bridge street Sibley street	Sibley street Graded, graveled and gutters paved	1,775 00	140 00	1,640 00	1,640 00 Jan J. Rens
	N. Jonia street Fairbanks street	Ottawa street	Ottawa street Graded and paved with cedar blocks		630 00	340 00	L. Schneider
K and added		F. Bridge durant	E. Bridge street. Renaved with cobble stones.	200 00	130 00	630 00	630 00 C. Prange

As shown in the foregoing tables there were 31,218 linear feet of streets improved of which:

Were graded and graveled	3,825 feet,
Were graded and graveled, with paved gutters	26,310 feet.
Were paved with cedar blocks	1.083 feet.

In the improvements noted there was used 2,891 feet of Medina, N. Y., sandstone curbing.

By platting and street opening the length of streets has increased 5 45-100 miles during the year. The total mileage of streets is 148.462, conditioned as to improvement as follows:

Graded and paved with wood and stone	5.900 miles.
Graded and paved with wood	1.595 miles.
Graded and paved with stone	1.178 miles.
Graded, graveled and gutters paved	48.350 miles.
Graded and graveled	32.285 miles.
Graded	3.000 miles.
Unimproved	,56.154 miles.
m	440.400.11

SEWERS.

Of sewers there were constructed 4,508 feet of brick, and 18,934 feet of vitrified tile, as shown by the table on the following page, which also shows the cost, etc.:

	CONTRACTOR.	9688 512,800 00 5500 00 513,300 00 J. Collins	J. McDermott	1,700 00 H. Wagemaker	J. McDermott	4,680 00 H. Wagemaker	200 00 2,600 00 C. Prange	J. DeBruen	J. Owens	J. Owens	J. Owens	124 00 1,070 00 J. DeBruen
	TOTAL COST.	\$13,300 00	200 00	1,700 00	00 046	4,680 00	2,600 00	1,030 00	00 099	700 00	820 00	1,070 00
1889.	ESTIMATED INCIDENTALS.	\$500 00	85 00	150 00	111 80	277 85		96 78	182 00	182 00	122 00	124 00
PRIL 30,	Сомтваст Рвіск.	\$12,800 00	415 00	1,550 00 150 00	828 20	352 65 4050 00	2,400 00	946 00	218 00	268 00	00 869	946 00
ING AI	Гвистн им Гвет.	968 658 695 837 1,350	69#	984	1 489 (\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	1,438	9 608 /	295	4	627	796
NE	Угановея. Сатсивавняя	<u>*</u>	~; ~;	8 _	; ;		 :	~~ ~~	_;		;	01 - 01
NG THE YEAR E	Size and Kind.	Brick, 18x27 Egg-shaped, 22x33 Egg-shaped, 24x36 1 Egg-shaped, 36x39 Egg-shaped, 38x42	9-in. glazed pipe	9-in. glazed pipe. 1 12-in. glazed pipe. (1 9-in. glazed pipe.)	1 9-in. glazed pipe. 1 12-in. glazed pipe. 5	12-in. glazed pipe		9-in. glazed pipe	9-in. glazed pipe	9-in. glazed pipe	
SEWERS COMPLETED DURING THE YEAR ENDING APRIL 30, 1889.	LOCATION OF SEWER.	From west line of East street west to South	Holbrook street From west line of East street to Packard street 9-in. glazed pipe	y From 25 feet south of Eleventh street to Eighth)	(From 50 feet east of West Side ditch to Alpine)	From Seventh street to West Leonard street	From West line of Perry street to Taylor street 12-in. glazed pipe	From 50 feet north of Fifth avenue to Pleasant 1 9 in. glazed pipe. 1 street	From 50 feet east of South Ionia street to	From east line of South Ionia street to South	South Ionia street	North Jefferson street From Second street to West Bridge street 12-in. glazed pipe
	NAME OF STREET.	Sherman, Wills and Pleas-	Holbrook street	Turner street	Croshy street	Alpine avenue	Quimby street	Madison avenue	Seventh avenue	Ninth avenue	South Ionia street	North Jefferson street

South Lafayette street	South Lafayette street From Fifth avenue to Pleasant street	- R	612 (1,377 00	153 00	1,530 00	429 1,377 00 153 00 1,530 00 F. C. Schneider
Fourth avenue	From 60 feet west of South Division street to Buchanan street		1,236	1,234 00	166 00	1,400 00	166 00 1,400 00 J. McDermott
West Broadway street	West Broadway street From California street to West Fulton street 9-in. glazed pipe	61	849	618 00	83 00	100 00	J. Owens
South Jefferson street	From 66 feet south of California street to Veto 9-in. glazed pipe	_ <u>:</u> _	202	250 00	20 00	300 00	300 00 Wagemaker
Bostwick street	From Crescent avenue to Lyon street 9-in. glazed pipe		551	290 00	00 08	670 00	C. Prange
South Union street	From 165 feet north of Cherry street to Kel. 19.in. glazed pipe		283	190 00	20 00	240 00	J. DeBruen
Gold street	From 50 feet south of West Bridge street to) 9-in, glazed pipe.		638 }	1,145 00	125 00	1,270 00	1,270 00 J. DeBruen
Paris avenue	From 127 feet south of Wealthy avenue to / , 9-in. glazed pipe. }		529) 858 (1,563 70	136 30	1,700 00	J. Owens
Bank street	From south line lot 8, Kent plat, to 40 feet 12-in. glazed pipe		196	167 00	4 3 00	210 00	210 00 J. & M. Myers
Alley between James and Henry streets	From 50 feet north of East and West alley to 9-in. glazed pipe	-:_		230 00	70 00	300 00	A. Wissman
Alley bet. Coit avenue and Clancy street §	From Trow bridge street to East Bridge street 9-in. glazed pipe	- 2-	1,119	2,300 00	150 00	2,450 00	Wagemaker
Alley block 19, Converse addition	Alley block 19, Converse! From 25 feet north of Shawmut avenue to! 9-in. glazed pipe 2 addition	; ; _	388	267 75	82 28	350 00	350 00 Jan J. Rens
		-					

In connection with all sewers in streets constructed during the year, a six-inch lateral for house connection was laid for each lot where platted, and where not platted they were laid about 50 feet apart. These laterals extend from the sewer to the street line on a rise of one-quarter of an inch to the foot.

For these lateral connections there were 17,106 feet of pipe laid.

There are in use in the city 47.127 miles of sewers, as per the following table:

Brick sewers	18.358 miles.
Glazed pipe sewers	26.276 miles.
Cement sewers	
Wood sewers	1.853 miles.
Iron pipe sewer in river	0.160 miles.
	47 107

There were 67 manholes and 48 catch basins constructed in connection with the work of sewer construction during the year.

BRIDGES, ETC.

The bridge over the East side canal at East Bridge street was completed and accepted June 23, 1888.

Cost of the work complete has been as follows:

Abutments	\$2,305	58
Superstructure	7,000	00
Total	\$9.305	

Under direction of the Council the repair of the river bridge at Bridge street was undertaken by the Board. The defect in the bridge was the undue lateral motion or swaying occasioned by heavy loads passing over it. The repair consisted in inserting between the end posts at each end of each span of the bridge shoe-struts to resist the strain of the lateral bracing, this feature being omitted in the bridge when constructed by the Morse Bridge Company. The

struts were made of two bars of channel iron, laced together and bolted to the posts at the point of connection of the lateral bracing. The work was done under contract by the Massillon Bridge Company, of Massillon, Ohio, for \$900.

The matter of reflooring Bridge street river bridge came to the Board for execution. A plan whereby the rails of the street railway track were placed upon stringers in such a manner as to place the tread of the rail level with the bridge floor, and which will admit of repairing or reflooring to be done without taking up the track. For the work on this bridge, and to have some stock on hand, the Board purchased, under competition, of Mr. George W. Palmer, of Wasepi, Mich., 60,446 feet board measure of white oak plank for \$20 per M., delivered in Grand Rapids. The cost of the lumber was \$1,208.92. The cost for labor and other material was \$494.09.

'To bring the approach up to the newly established grade line—in conformity with the canal bridge—there was expended for labor and material \$252.76. Superintendence of the work and inspection of the lumber cost \$112.37.

There was also a small expenditure for repointing the piers, amounting to \$69.01, making a total of \$3,037.15 expended in repairs, etc.

WATER WORKS.

Considerable work looking to the betterment of the waterworks system was effected during the year, viz: The construction of a new pump to replace one of the old ones, one of nearly double the capacity of that removed; a new boiler; an additional and much larger river crib, and a new conduit therefrom to the pump well; an additional pump to work under direct pressure; the division of the distribution into high and low level districts, the latter to continue under reservoir pressure, while the former is supplied under direct pressure for the present; the construction of an annex for

the high service pump and another for the boiler; also a new coal shed, which, together with the replacement of some Wyckoff pipe with iron, will constitute the betterments.

PUMPING MACHINERY.

The new pump is a double acting piston pump, 20 inches in diameter and six feet stroke. When running at ordinary speed it will pump 5,000,000 gallons per day.

The pump is constructed after plans prepared by Mr. George E. Kirk, engineer at the pump house, by the Eagle Iron Works, of Detroit, Mich., on a contract awarded March 17, 1888, for \$5,584.15.

Mr. Kirk also designed a new appliance for operating the exhaust valves of the engine used for driving the foregoing described pump, which was constructed by Adolph Leitelt, of this city, for \$745, the contract for which being awarded April 14, 1888.

The boiler was constructed by Mr. Leitelt, and a contract awarded March 31, 1888, for the sum of \$4,100.

The boiler is of the marine type, constructed of steel, with length inside of 12 feet, and 10 feet in diameter, containing 152 three and one-half inch flues, eight and one-half feet long. There are two furnaces, each four feet two inches wide by seven feet long.

The high service pump has steam cylinders 20 inches in diameter, pump cylinders 12 inches diameter with stroke of 18 inches. It is designed for use as an auxilliary pump. It was constructed by the Gordon & Maxwell Company, of Hamilton, Ohio.

The annex to the pump house in which this pump is placed is a brick veneer building 20 x 24 feet. The annex and pump cost \$3,652.63.

An annex was built for the new boiler in dimensions 25x45 feet, two sides of which being the original building.

A coal shed was enclosed, it being in part new construc-

tion and in part within the old wood shed. This work cost \$1,706.84. Prior to September but slight extensions to the pipe system were made, and that for the purpose of fire protection to new manufacturing establishments.

A force main to supply the hill service was laid from the pumping station to connect with the mains in Clinton and Livingston streets; a portion is for temporary use as such. When the 16-inch main is extended from Ionia street eastward the portion for temporary use, which is eight inches in diameter, will become a part of the low service distribution system. Of the old pump-logs and Wyckoff pipes that were leaking badly there were removed and replaced with iron pipe 4,681 feet.

This removes all the pump logs and the worst of the others, but the condition of the remaining Wyckoff pipes is such as to necessitate their removal as soon as practicable.

The following table shows where pipe was laid, number of new hydrants and valves set, etc.:

STREET.	FROM	то	DIAMETER IN INCHES.	LENGTH IN FEET.	NEW Hyd'rs	NEW VALVES	REMARKS.
Clinton st	Hastings st	Newberry st	!	1147		١	Pump log removed
Clinton st	Hastings st	Newberry st	6	524	1		New line
Crescent ave	N. College ave.	Benson st		767	· · · · ·	ļ	Pump log removed
Crescent ave	N. College ave.	Benson st	6	350	1	¦	New line
Crescent ave	Barclay st	N. Lafayette st.	14	509	١	ļ	Wyckoff pipe remd
Ransom st	E. Bridge st	Lyon st	4	1105	1	. 1	Pump log and w.
Lyon st	Canal st	Ottawa st	10	601	١	ļ	Wyckoff pipe remd
Clancy st	E. Bridge st	Hastings st	6	643	1	ļ	Pump log removed
Coit ave	Hastings st	Trowbridge st	6	566	····	ļ	Pump log removed
Broadway st	Eighth st	Ninth st	12	385	1	1	New line
Coldbrook st	Pump house	N. Ionia st	4	60	,	1	Drain
Coldbrook st	Pump house	N. Ionia st	16	722		1	f High service
N. Ionia st	Coldbrook st	Newberry st	8	1986	2	1	Temporary force mains
Newberry st	N. Ionia st	Livingston st	8	881	, 1	. 2	Temporary force mains

To provide for an increase of water consumption, and for the abandonment of the old sources of supply (Coldbrook and Carrier creeks) which are becoming seriously polluted from the large number of people settling in the valleys along the creeks, an additional infiltration crib was constructed in the river and a connection made with the old one, and from thence to the pump well a new and larger conduit was laid.

The crib is constructed of 2x12 hemlock plank, each course being separated from the one adjoining by strips of lath, for the admission of water. The top is planked close and battened. Internal dimensions are four feet in width, 104 feet in length, height three feet. The whole is surrounded with fine gravel, through which water must pass before entering the crib, thus removing all matter in suspension, and making the water as clear as that from any well or spring at this time.

The cost of crib and conduit was \$2,674.91.

On the 9th day of July, 1888, the Board submitted to the Common Council their reasons for the necessity of extending the water mains, together with an estimate of the cost of such extension to an aggregate of 56 miles, and indicated some of the streets in which it was proposed to lay mains. The estimated cost of such extension and incidental expenses connected therewith was \$150,000.

July 16 the Committee on Ways and Means of the Common Council reported favorably upon the matter of submitting the question of bonding the city for \$150,000 for extending the water mains to a popular vote; also offering a resolution ordering the submission of the question, fixing as the time for the election at August 7, which report and resolution was adopted.

The Board submitted to the Council on the 23d day of July a complete list of the streets in which they proposed to

lay mains, should the proposition of bonding the city be carried at the coming election.

A canvass by the Common Council on the 9th day of August of the votes cast showed a majority of 1,853 votes favorable to the proposition.

That pipe laying might be commenced at the earliest possible time, bids were received for furnishing about five miles of four and six-inch pipe. On the 11th day of August the contract was awarded to Dennis Long & Co., at the following prices:

 Six-inch pipe.
 \$26 00 per ton delivered

 Four-inch pipe.
 26 40 "" "

The Galvin Brass and Iron Works were awarded the contract for furnishing the valves and hydrants required for this work, at the prices named below:

Size of valve	10-in.	8-in.	6-in.	4-in.
Price each	529 00	\$20 00	\$13 25	\$8 00
Six-inch* hydrants, each				\$38 00
Five-inch hydrants, each				3£ 00

As soon as practicable thereafter bids were received for furnishing cast iron pipe, hydrants and valves for the contemplated work. On the 8th day of September, 1888, the bid of R. D. Wood & Co., of Philadelphia, Pa., for furnishing the pipe delivered at the following figures was accepted and the contract awarded:

Diameter of pipe, in inches,	16	12	10	8	6	4
Price per ton	\$24 35	\$21 45	\$24 45	\$24 55	\$24 55	524 95

Special castings, 21/2 cents per pound.

R. D. Wood & Co. also received the award for furnishing the hydrants, prices per hydrant being:

Six-inch hydrants, each	\$ 38	50
Five-inch hydrants, each	34	00

The contract for furnishing the valves was awarded the Galvin Brass and Iron Works, of Detroit, Mich., at the following prices:

Size of valve	16-in. 12-in.	10-in.	8-in.	6-in.	4-in.
Price each s	70 00 \$36 00	£26 50	519 50	513 00	\$7 90

Before the ground became frozen too hard, January 19, 1889, there was laid 12.6 miles of the proposed mains, and to date, April 30, 20.4 miles of mains are laid, making the total mileage 48.4, with 526 hydrants and 358 valves.

The following shows the streets in which pipe has been laid since September, 1888, also showing number of valves and hydrants set, length, size of pipe, etc. It being altogether extensions to the pipe system:

STREET.	FROM	то	DIAMETER IN INCHES.	LENGTH IN FERT.	NUMBER OF VALVES. NUMBER OF HYDRANTS.
Broadway street	Ninth street	Webster street	12	1970	<u> </u>
Broadway street	Ninth street	Webster street	10	1835	4 7
West Leonard street	North Front street.	Alpine avenue	8	270	; <u> </u>
West Leonard street	North Front street.	Alpine avenue	12	3158	5 11
Carrier street	Plainfield avenue	North avenue	6	1960	2 4
Madison street	Plainfield avenue	North avenue	6	1433	2 5
Straight street	W. Bridge street	Jackson street	6	989	2 4
Jackson street	Straight street	S. Pine street	6	1695	3 4
No. and So. Pine sts	Jackson street	Second street	6	1823	3 4
Michigan street	W. Bridge street	Fourth street	4	742	. .
Michigan street	W. Bridge street	Fourth street	6	835	2 4
First street	Michigan street	N. Pine street	4	1056	2 3
West Bridge street	Indiana street	Lincoln street	12	595	ļ
West Bridge street	Indiana street	Lincoln street	8	1042	2 6
South Front street	W. Fulton street	Baldwin street	12	1389	
South Front street	W. Fulton street	Baldwin street	8	1026	4 5
Seventh street	Broadway street	Stocking street	10	2830	3 6
Butterworth avenue	S. Front street	River avenue	8	2269	4 7

STREET.	FROM	TO	DIAMETER IN INCHES	LENGTH IN FEET.	NUMBER OF VALVES.	NUMBER OF HYDRANTS.
West Fulton street	Gold street	Gunnison street	12	1015		ļ
West Fulton street	Gold street	Gunnison street	10	647	8	4
Turner street	W. Bridge street	W. Leonard street.	6	2788		
Turner street	W Bridge street	W. Leonard street.	4	2439	6	12
Fourth street	Broadway street	Seward street	8	846		
Fourth street	Stocking street	Fremont street	6	985	3	5
Fourth avenue	S. Division street	Buchanan street	4	1290	1	2
South Ionia street	Wealthy avenue	Hall street	12	38	J	
South Ionia street	Wealthy avenue	Hall street	6	2589	8	18
Finney street	Williams street	Wealthy avenue	6	1015		4
Bartlett street	East of Finney st	S. Waterloo street	6	12		
Bartlett street	East of Finney st	S. Waterloo street	4	716	1	1
Ninth avenue	S. Division street.:	M. C. R. R. ground	6	1945	1	2
South Lafayette street.	Cherry street	Fifth avenue	6	2983		ļ
South Lafayette street.	Cherry street	Fifth avenue	4	961	8	12
efferson avenue	Sycamore street	Hall street	6	8169	4	5
Fifth avenue	S. Lafayette street.	Madison avenue	8	784	1	8
Grandville avenue	Goodrich street	Fifth avenue	4	72		
Grandville avenue	Goodrich street	Fifth avenue	12	3189	6	10
Ottawa street	Monroe street		12	884	2	2
N. and S. College ave.	Lyon street		12	15		
N. and S. College ave.	Lyon street	-	16	4918	8	7
Cherry street	Henry street	East street	8	667	1	1
Henry street	Cherry street		4	1389	2	2
Charles street	Cherry street	Wealthy avenue	4	1426	2	2
ames street	Cherry street	Wealthy avenue	4	1372	2	2
Holbrook street	Packard street	East street	4	468	ļ	1
Kellogg street	Packard street	S. Union street	4	820	1	1
Packard street	Cherry street	Lake avenue	4	757	2	1
N. and S. Union st	Crescent avenue	Thomas street	4	4810		
N. and S. Union st	Crescent avenue		6	1979	9	5
Paris avenue		Logan street	4	656	1	1
Elisworth avenue	E. Fulton street	Cherry street	12	1306	1	2
	Oakes street		1	2805	3	7

STREET.	FROM	то	DIAMETER IN INCHES	LENGTH IN FRET.	NUMBER OF VALVES.	NUMBER OF HYDRANTS.
Lagrave street	Wealthy avenue	Blakeley avenue	4	1037	1	2
Blakeley avenue	Lagrave street	Sheldon street	6	328		1
Goodrich street	Grandville avenue.	S. Waterloo street	4	1197	1	1
Calder street	E. Fulton street	Island street	6	361	1	, 1
First avenue	S. Division street	S. Ionia street	4	645	1	İ
Second avenue	West of S. Division	Buchanan street	4	1033	1	1
Second avenue	Grandville avenue.	West	4	498	1	1
Third avenue	S. Division street	S. Ionia street	4	660	1	ļ
Hilton street	Prescott street	Fifth avenue	6	2112	2	6
Chestnut street	Grandville avenue.	Oakland avenue	4	546	1	1
W. Broadway street	W. Bridge street	Butterworth avenue	4	4026	5	7
Gold street	W. Bridge street	Butterworth avenue	4	3286	4	7
Straight street	Watson street	Shawmut avenue	6	1671	3	5
Shawmut avenue	S. Jefferson street	Straight street	6	986		3
North Prospect street	Lyon street	E. Bridge street	4	1020	2	1
North avenue	E. Bridge street	Hastings street	6	731	1	2
Sinclair street	E. Bridge street	Hastings street	4	719	1	2
North Lafayette street.	E. Bridge street	Trowbridge street	6	1257	1	2
Center street	Blakeley avenue	Monson street	6	3396	4	4
Sixth avenue	S. Division street	S. Ionia street	4	660	1	ļ
Seventh avenue	S. Division street	S. Ionia street,	4	660	1	••••
Eighth avenue	S. Division street	S. Ionia street	4	660	1	ļ
Eleventh avenue	S. Division street	S. Ionia street	4	660	1	! . • • •
I'welfth avenue	S. Division street	S. Ionia street	4	660	1	١
Thomas street	Madison avenue	S. Union street	4	1316	4	2
Henry street	Wealthy avenue	Thomas street	6	1978	2	3

CITY HALL.

The city hall was completed and accepted in September last and dedicated to public use on the 26th day of that month, and immediately thereafter occupied by the several city officials.

As the work of construction was in progress some changes from the original plan were made which added slightly to the cost. The more costly changes being the extension of the front entrance steps by substituting a broad landing of granite for one of the regular steps, extending the walls at ends of steps, coping same with polished granite and finishing off with bronze scrolls and statuary.

Also substituting for the marble tile required in the contract, French tile of different patterns, the tile used being very hard and durable, and costing a considerable in excess of the marble tile.

The steam heating was put in by the Detroit Metal and Heating Works, on a contract awarded February 24, 1885.

Mantels, grates and gas fixtures were furnished and put in by Messrs. Shriver, Weatherly & Co., of this city.

The building has cost as follows:

Contract price	\$185,641	68
Extra work, not included	3,494	12
Tiling floors	8,899	96
Steam heating	11,909	80
Stone walks and coping	10,446	15
Mantels and grates	1,888	10
Gas fixtures	3,135	21
Elevator and connections	3,168	58
Tower clock	2,231	61
Bronze work	1,163	12
Painting and oiling floors	. 825	63
Grading and sodding lot, sewers, etc	1,332	63
Printing	292	87
Architect's fees	6,000	00
Inspection	5,256	00
Total	\$245,685	46

The furniture for the building was procured by the Common Council.

RECAPITULATION.

01. 1. II
City hall \$245,685 46
Street improvements
Sewers
Bridges
Bridge repairs 900 00
Bridge reflooring and approaches to
Extension of mains and relaying with iron where wood was
removed
New pump, connections and valve motion (low service) 7,298 99
New boiler and connections
Pump and connections (high service)
Annex and pump foundation
River crib and intake
Coal shed and boiler house
Total
Engineering expenses in connection with the foregoing
work have been:
For salaries
For sundry expenses
Total
Respectfully submitted

Respectfully submitted,

H. A. COLLAR,

City Engineer.

SEVENTEENTH ANNUAL REPORT

OF THE

Board of Public Works

OF THE CITY OF

GRAND RAPIDS, MICHIGAN.

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For the Fiscal Year Ending April 30th, 1890.

GRAND RAPIDS, MICH.:
DEAN PRINTING AND PUBLISHING COMPANY
1890

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ANNUAL REPORT

OF THE

Board of Public Works

TO THE

Common Council of the City of Grand Rapids,

TRANSMITTING THE REPORTS OF

THE COLLECTOR, CITY ENGINEER, ENGINEER OF PUMPING WORKS, AND INSPECTOR OF WATER WASTE.

THE FISCAL YEAR ENDING APRIL 30, 1890.

GRAND RAPIDS, MICH.: The Dean Printing and Publishing Co. 1890. •

BOARD OF PUBLIC WORKS.

JAMES N. DAVIS, PRESIDENT Term expires	May,	1892
EDWIN F. UHL, MAYOR Term expires	May,	1891
W. R. SHELBYTerm expires	May,	1891
ALLEN C. ADSIT Term expires	May,	1891
FRANCIS LETELLIER Term expires	May,	1893
ELI F. HARRINGTON Term expires	May,	1893

OFFICERS.

H. A. COLLARCity Engineer
FRED A. TWAMLEY Secretary and Collector
THOMAS J. WILLARDAssistant Collector
George E. KirkEngineer of Pumping Works
JOHN VAN AMBERG Supt. of Repairs and Construction
A. PER LEE'Inspector

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REPORT OF THE BOARD.

OFFICE OF THE BOARD OF PUBLIC WORKS.

To the Honorable the Mayor and Common Council of the City of Grand Rapids:

Gentlemen—In accordance with custom, the Board of Public Works transmit to your honorable body their annual report of improvements in the city, made under their direction during the year ending April 30, 1890. The reports to the board of the city engineer, collector of water rates, engineer of the pumping works, and inspector of water waste, are also transmitted to your honorable body for consideration.

STREETS.

The streets of the city now aggregate 152 952-1000 miles in extent, being an increase by platting and opening of 4 490-1000. Of the total amount 98 098-1000 miles are improved, and 54 854-1000 unimproved. Increase of improved streets since last report is 5 790-1000 miles. Grade lines of streets have been established in length 18 430-1000 miles, an increase of 9 890-1000 miles over previous years. There is a manifest desire of our citizens to have our streets improved in the future in a more substantial manner, and although the first cost of the improvements will be greater, it will, no doubt, be more economical in the end, owing to greater durability, and less expense for repairs.

SEWERS.

The construction of sewers during the year has been confined to laterals of vitrified salt-glazed pipe. The total length of sewers now in the city is 22 622-1000 miles. The increase in length of sewers is 2 840-1000 miles. In connection with sewers there has been constructed 45 man-holes and 15 catch-basins; 11 catch-basins have been built in connection with other street improvements.

BRIDGES.

New bridge work is confined to one bridge of small dimensions over Coldbrook, near north end of Clancy street.

The repair of bridges was placed in the hands of the board by resolution of the council of July 8, 1889. Upon inspection it was found that repairs were needed on the Leonard, Sixth, Pearl and Fulton street bridges. Leonard and Sixth street bridges had lateral bracing tightened and the piers pointed. Pearl street bridge roadway was replanked and the lateral system of this and Fulton street bridges was readjusted by an experienced workman, sent by the Massillon Bridge Company, who were the contractors for the erection of said bridges. Lumber for the replanking of the Fulton street bridge was contracted for, and paint purchased for repainting the bridges at Sixth, Pearl and Fulton streets.

WATER WORKS.

The extension of water mains under the \$150,000 loan, voted by our citizens, and the \$80,000 authorized by act of the legislature for the replacement of Wyckoff wooden pipe with iron, the erection of a stand pipe and connecting it with the water system by a large main, has been completed, with the exception of replacing 3.90-100 miles of Wyckoff pipe. This small portion of the Wyckoff pipe is in a fairly good condition, and will last for a considerable length of time, in all probability, being small pipe and not subject to any great or sudden strain. Enough of the funds raised for this purpose is available, and although temporarily transferred to another fund, can be recalled and used for the purpose for which it was originally intended.

At the time the vote on the \$150,000 loan was taken it was supposed that the amount would only be sufficient to increase the extent of the water mains to 56 miles, just double what it was at that time, but the premium obtained for the bonds, together with the favorable terms obtained for iron pipe, enabled the board to increase the pipe in extent to 65.92 miles. Of the pipe now in use 62.02 miles is iron and 3.90 miles Wyckoff pipe. In connection with these mains are 636 fire hydrants and 504 gate valves. The report of the city engineer shows the streets in which water mains are laid, the location of every hydrant and valve, and is a very valuable document for reference.

In order that the elevated portion of the city might have water furnished under heavier pressure than furnished by the reservoir, a lot was purchased adjoining that now owned by the city, a stand pipe 75 feet in height and 30 feet in diameter erected thereon, and an iron pipe sixteen inches in diameter laid connecting with the pumps at the pumping station. This improvement has proven a success, and the citizens residing in that portion of our city have the satisfaction of enjoying the privileges of a bountiful supply of water under circumstances as favorable as residents on the lower levels.

WATER SUPPLY.

The extension of water mains rendered it necessary to increase our water supply. Coldbrook and Carrier creeks were not only inadequate in quantity, but the sources of contamination consequent upon increased population and street improvements, rendering it imperative that a change should be made. The board, therefore, decided to practically abandon the former source of supply, and rely wholly upon Grand A filter bed near the center of the river, 45 feet in width by 460 feet in length, was constructed, in addition to the former filter beds, 10 by 100 and 6 by 8. The new filter was made by excavating the rock bed of the river to a depth of five feet. In the center of the excavation are three collecting galleries 24 by 24 inches inside measurement, constructed of hemlock fencing, each course separated by one-half inch strips placed one foot apart. The galleries are covered by two courses of plank laid with close joints. The galleries are joined together at the lower end and a conduit, three by three feet, leads to a new and larger pump-well near the pump-After the galleries were placed in the bottom of the excavation the pit was filled with broken stone and gravel of several grades in fineness, commencing with the coarsest at the bottom and ending with the finest on the top; the work was completed and water turned in about the first day of October, 1889.

The construction of the filter bed, as well as using Grand river as a source of water supply, has caused considerable discussion pro and con by the press and citizens of the city. To show that a river supply is a common one, the following statistics taken from compilations on the subject, are given: Number of cities containing a population of twenty thousand or over 166, with an aggregate population of 16,660,000.

Number of cities supplied by rivers only, eighty-three, containing an aggregate population of 8,889,500.

Number of cities drawing their supply from rivers, creeks and brooks, twenty-nine.

Number whose supply is taken from wells, galleries, surface water, etc., fifty-four.

This does not show that a river supply is the best that can be obtained, any more than the arguments, of directly or indirectly interested persons against such supply, prove that it is the worst.

The Board of Public Works were in this matter guided by the fact, that it was the only source of supply visible, in quantity sufficient to meet an immediate and imperative demand, and they furnished it in as pure a state as they could with the means at their disposal. This source of supply will have to be relied upon until a more satisfactory one is developed, and the means provided to obtain it.

PUMPING STATION.

The extension of mains during the past year called for corresponding enlargement of buildings and machinery. The boiler room was enlarged and rearranged, and the boilers turned around so that the firing could be done at the north end next to the coal shed. The increased consumption of coal rendered necessary increased storage capacity to avert a possible shortage. To meet this necessity the coal shed has been sufficiently enlarged to hold 900 tons. No. 1, after thirteen years' use, has become useless, and has been replaced by a Babcock & Wilcox water tube boiler. now in use are one Babcock & Wilcox water tube, one marine and one tubular boiler. A large platform scale has been placed at the entrance to the coal shed for the purpose of weighing coal purchased, and a smaller scale at the entrance to the boiler room from the coal shed to weigh the coal as it is fed to the boilers to enable the Board to determine what kind of coal is the most economical fuel. A large pump, of the capacity of 2,500,000 gallons every twenty-four hours, has been added for the high service.

The Collector's report shows that the number of services now open is 2,866, an increase of 710 over previous year. This increase would have been greater had it not been well advanced in the season before the laying of water pipes was completed.

The receipts from water rates, permits, etc., for the year

were	\$43,830	12
Paid for maintenance and repairs	26,605	93
Excess of receipts over maintenance and repairs	17,224	19
Total receipts of water works to date	370,356	93
Total paid for maintenance and repairs to date	230,679	74
Excess receipts over cost of maintenance and repairs	139,677	19

If credit is given the water system for fire protection per hydrant equal to the average rate for like service in the United States, the total credit to the system will be \$393,559.19. Water is furnished free to 57 private fire protection lines to manufacturing establishments, for watering six parks, five public fountains, the public hay market, for all public work and flushing sewers; one-half rates are given to 21 public schools and 7 fire engine houses, and one-sixth rates to 16 watering troughs.

Total expenditure for water plant from creation of the system to date, \$841,803.67. This makes the cost per mile of mains, \$12,770. That this showing is favorable to the city, we give the comparative cost of the Grand Rapids water plant with those of eight cities of the United States whose population and extent of mains are nearest in number and extent to our own, as follows:

	No. Miles.	Cost per mile.
Columbus, Ohio	. 70	\$16,500
Toledo, Ohio	. 56	22,321
Denver, Col	60	20,000
Patterson, N. J	. 65	16,900
Fall River, Mass	. 60	29,240
Troy, N. Y	. 53	22,100
Alleghany, Penn	. 70	23,300
Reading, Penn:	. 59	19,780

From the report of the engineer at the pumping station, we learn that the total number of days that the pumps were run was 365; the number of revolutions made, 12,103,230; the number of gallons of water pumped, 1,210,018,700; consumption of coal was 5,917,394 pounds, and that the cost of coal was \$10,391.23. The average daily consumption of water has been 3,315,119 gallons, as against 2,716,736 gallons for the year previous, an increase of 22 per cent., notwithstanding the fact that 376,852,900 gallons were

pumped into the stand pipe at 75 feet elevation above the reservoir, and the pumps changed to take suction from the river instead of the settling basin, the cost of fuel, for delivering one million gallons of water into the high and low services is less than the previous year, showing that the changes in machinery and fuel have been beneficial. The total expense of the year at the pump house, including salaries, repairs, fuel, etc., is \$16,428.19.

Water waste inspector's report shows that the number of premises supplied with water unmetered, is 2982; and the fixtures, are baths, 399; closets, 2091; wash basins, 367; sink faucets, 1360; urinals, 60; hydrants, street washers and sill cocks, 3291; miscellaneous, 377; all of which have been carefully inspected.

PARKS.

The board having presented a plan for the improvement of Lincoln Park, which was acceptable to the Council, they were authorized to expend a certain amount in its improvement. Accordingly grading was commenced, trees removed, etc. The amount expended will appear in the general summary.

Total expenditures for the year are:

Water works \$	125,918 15
Bridges and repairs	4,067 17
Streets	80,800 00
Sewers	10,698 30
Parks	1,174 49
Engineer's salary, etc	4,401 88
General inspector	1,081 50
Inspection of water pipe	1,654 78
Local inspection	305 50
Bridge inspection	30 00
Total	230.131 77

, 1890.

June 21, 1890.

All of which is respectfully submitted.

JAMES N. DAVIS,
W. R. SHELBY,
ALLEN C. ADSIT,
FRANCIS LETELLIER,
E. F. HARRINGTON,
Board of Public Works.

SECRETARY'S REPORT.

Office Board of Public Works, Grand Rapids, Michigan, May 1, 1890.

To the Honorable Board of Public Works:

Gentlemen—I respectfully submit to your honorable body the following report for the year ending April 30, 1890:

The number of services connected with the city's works on the 1st of May, 1889, for which permits were issued, were	2,493
Number of services put in the past year, for all of which permits were issued	736
Total	3,229
Number of special connections existing May 1, 1890	98
Total numbar of connections on May 1, 1890	3,327
Number of services now cut off	461
Number of services now open	2,866
The receipts for the year have been as follows:	
From water rates, fines, etc	\$ 42,200 12
From water permits	1,630 00
Total income from water works	43,830 12
Miscellaneous receipts	5,360 80
Total receipts for the year	49,190 92
Cash on hand May 1, 1889	1,833 17
Total	51,024 09

Deposits have been made with the City Treasurer year as follows:	during t	the
To the credit of the water works income fund \$	44,340	41
To the credit of the water works fund	5,100	81
To the credit of general fund	60	00
Total deposits during the year \$	49,501	22
Cash on hand to balance	1,522	87
Total	51,024	09
Receipts from May 1, 1874, the commencement of c to May 1, 1889:	ollection	ns,
From water rates, fines, etc	314,546	83
From water permits		
From various sources (per past reports)	-	10
Total	333,027	82
Receipts for the past year	49,190	92
Total receipts to date	382,218	74
Deposits made from May, 1874, to May 1, 1889:		
To the credit of the water works income fund \$ 3	125,631	15
To the credit of various funds (per past reports)	5,563	50
Total\$	31,194	65
Deposits made the past year	49,501	22
Cash on hand to balance	1,522	87
Total\$	382,218	74

STATEMENT OF EXPENDITURES.

MAY 1, 1889, TO MAY 1, 1890.

CONSTRUCTION OF WATER WORKS.

1-PIPE SYSTEM.

Extension of mains	. •		\$83,133	23
2Pumping Machinery, Etc.,	Low SE	RVIC	CE.	
North pump connection, etc			\$2,297	67
3-Pumping Machinery, Etc.,	High Se	ERVI	CE.	
Smith Vaile pump and connections Babcock & Wilcox boiler and piping Stand pipe for high service	5,744	81	\$25,578	51
4—River Connecti	on.			
Pump well	1,523	57	\$ 13,835	59
5—Buildings.				
Enlarging coal shed and engine house			516	89
6-METERS.				
New meters and setting				
Total Paid previous to May 1, 1889				-
Cost of works to date	ollars of			•

MAINTENANCE AND OPERATION OF WATER WORKS.

1-PUMPING.

Salary engineer	\$ 1,200	00
Salary assistant engineer	900	00
Salary second assistant engineer	780	00
Salary first fireman	570	00
Salary second fireman	600	00
Salary third fireman	600	00
Fuel	11,752	64
Repairs to boiler	• •	89
Supplies (oil, packing, etc)	898	46
Telephone	40	55
Incidentals	20	75
	\$ 17,440	29
2—Office and Collecting.		
One-fourth salary clerk and collector	337	56
Salary assistant collector	720	
Salary second assistant (one-half)	240	00
Books, stationery and printing	89	86
Stamps and postals	95	6 0
3—Repairs and Inspection.	\$ 1,483	02
Salary of Supt. of repairs and construction \$ 1,200 00		
Salary inspector of water waste 860 oo		
	\$ 2,060	оо
I—IRON PIPE.	·	
Labor	\$ 248	63
2—WYCKOFF PIPE.		
Labor \$ 406 18		
Material 27 64		
	\$ 433	82
3—FILTER AND INTAKE.		
Labor	73	50
	/3	J

4-RESERVOIR.

5—SETTLING BASIN. Labor	Labor	\$ 132 76
6—HYDRANTS. Labor	5—SETTLING BASIN.	
Labor	Labor	185 26
Material 62 54 ————————————————————————————————————	6Hydrants.	
BMeters 107 31 8Meters 123 52 894 27 9- Service Connections 123 52 894 27 9- Service Connections 144 145 154 50 19-Supply Creeks 175 166 25 175 166 25 175 166 25 175		\$ 1,107 13
8METERS. Labor (reading meters, etc) \$ 770 75 Material	7-Valves.	
Labor (reading meters, etc)	Labor	107 31
Material 123 52 — \$ 894 27 9— Service Connections. Labor \$ 791 14 Material 668 32 — \$ 1,459 46 Ig—Supply Creeks. Watchman \$ 154 50 Labor 11 75 Tools and supplies \$ 261 68 Barn and horse 425 32 Blowing off 78 63 Shop and storehouse 8 60 Telephone at foreman's residence 40 00 \$814 23	8Meters.	
Labor	· · · · · · · · · · · · · · · · · · ·	\$ 894 27
Material	9— Service Connections.	
Watchman \$ 154 50 Labor 11 75 — \$ 166 25 Miscellaneous Tools and supplies \$ 261 68 Barn and horse 425 32 Blowing off 78 63 Shop and storehouse 8 60 Telephone at foreman's residence 40 00 \$814 23	•	\$ 1,459 46
Labor. 11 75	19—SUPPLY CREEKS.	
Tools and supplies \$ 261 68 Barn and horse 425 32 Blowing off 78 63 Shop and storehouse 8 60 Telephone at foreman's residence 40 00 \$814 23		\$ 166 25
Barn and horse 425 32 Blowing off 78 63 Shop and storehouse 8 60 Telephone at foreman's residence 40 00 \$814 23	MISCELLANEOUS.	
	Barn and horse 425 32 Blowing off 78 63 Shop and storehouse 8 60	\$8.4.00
\$ 7.682 62		\$ 7,682 62

RECAPITULATION.

Pumping	\$ 17,440	29
Office and collecting	1,483	02
Repairs and inspection	7,682	62
Total paid for maintenance and operation	\$ 26,605	93
Paid for maintenance and operation previous to May		_
1, 1889	204,073	81
Paid during the past year	26,605	93
Total paid for maintenance and operation to date	\$230,679	74
Income for the year	43,830	I 2
Cost of maintenance and operation	26,605	93
Excess of receipts over expenditures	\$17,224	19
Of the 471 meters last reported, 48 of them have	e been fou	ınd

Of the 471 meters last reported, 48 of them have been found unfit for further service, and are not accounted for. The balance, with the 29 meters purchased during the year, make 452 meters owned by the city, as follows:

NAMES OF METERS.	Running	In Shop	Total.
Ball & Fitts Rotary	63	11	74
Worthington	229	1 7	236
Crown	67	10	77
Rall & Fitts Piston	19	3	22
Duplex	85	4	39
Hersey	4	0	4
Total	417	35	452

Forty-six leaks on mains have been repaired; of these 24 were on Wyckoff pipe, and 22 on iron pipe.

Two hundred and ninety-three permits to connect with the public sewers were issued during the year.

Respectfully submitted,

Fred A. Twamley, Secretary and Collector.

ENGINEER OF PUMPING WORKS

GRAND RAPIDS, PUMP HOUSE, May 1, 1890.

To the Honorable Board of Public Works:

GENTLEMEN- I have the honor to submit the engineer's report for the year ending May 1, 1890.

The following table shows the number of days run for each month, number of revolutions made, gallons of water pumped, amount of coal burnt for pumping and raising steam, and the cost of the same:

MONTH.	DAYS RUN	TOTAL TIME RUN	No. of Revolutivs	GALLONS OF WATER PUNPED	Pounds of Coal. Burned	COST OF	POUNDS OF COAL RAIS- ING STEAM	COST OF COAL RAIS-	TOTAL COST OF COAL
May	31	1289:56	1,304,858	88,425,730	519,228	\$908,14	1800	\$3.15	\$ 911. 2 9
June	30	1087:29	991,757	83,143,930	421,578	737.75	1700	2.87	740.62
July	31	1026:25	813,296	104,256,600	386,851	678 98	1875	3.28	682.26
August	31	1244:00	966,662	135, 116, 070	598,872	1,049.05	3900	6.82	1,055.87
September	30	1160:50	956,938	124,549,240	539,480	949.04	1350	2.36	951.40
October	31	1093:15	996,757	106,913,280	514,044	899.57	1714	2.88	902.45
November	30	1201:30	884,451	91,090,590	466,465	816.31	·		816.31
December	31	1228:40	994,478	90,498,640	417,089	729.90			729.90
January	31	1235:45	1,024,365	93,764,000	535,886	937.80	3000	5.25	943.05
February	28	1135:10	1,024,738	92,624,620	456,905	799.58	1000	1.75	801.33
March	31	1890:55	1,112,190	103,725,000	539,258	940.20	1000	1.75	941.95
April	30	1265:80	1,032,740	95,911,000	521,743	913.05	1000	1.75	914.80
Grand Total	365	14359:09	12, 103, 230	1,210,018,700	5,917,394	10,359 37	18,339	\$31.86	10,391 23

The average daily consumption of water for the year has been 3,315,119 gallons.

Against an average the previous year of 2,716,736 gallons An increase of over 22 per cent. Total cost of fuel to pump 1,000,000 gallons of water into the high and low systems, \$8.58.

Total cost of pumping, \$13.57.

The total number of gallons of water pumped into the stand pipe for the year, at an elevation of 234 feet, including suction lift, is 376,852,900 gallons. Notwithstanding this increase in the height of pumping the above amount of water, and the fact that all the other engines were changed to take suction from the river instead of the settling basin, which increases the height of pumping on all the reservoir engines from 16 to 20 feet, the cost of fuel for delivering 1,000,000 gallons into the two systems is less than last year, which clearly proves that the changes made in the machinery and boilers have been beneficial. I should like to keep the reservoir and the stand pipe pumping in separate tables, but as one boiler is sometimes used for both engines, it will be seen that it is not practicable.

The running expenses for the year have been:

For repairs on engines and boilers	\$	79	2 I
For lights, oil, packing and waste		563	88
For rubber valves for north and south pumps		743	87
For coal delivered to the boilers	1	0,391	23
For salaries of engineers and firemen		4,650	00
Total •	\$1	6,428	19

I am glad to be able to report to you that the engines and boilers are all in good working order.

The rapid increase in the consumption of water, and the danger of accidents to the present engines, warns us of the necessity of providing another pumping engine. A period of from 12 to 18 months will be required to construct and put in operation a pumping engine, and at the present rate of increase, all the machinery we now have will be taxed to its utmost capacity by that time.

Respectfully submitted,

GEORGE E. KIRK,

Engineer.

INSPECTOR'S REPORT.

Office Board of Public Works | Grand Rapids, Michigan, May 1, 1890.

To the Honorable Board of Public Works:

Gentlemen—I respectfully submit the following report for the year ending April 30, 1890:

Total number of premises supplied with city water (not metered), 2,982. Total number of fixtures, 7,945, as follows:

Baths	399
Closets	2,091
Wash basins.	367
Sink faucets	1,360
Urinals	60
Hydrants, street washers and sill cocks	3,291
Miscellaneous	377
Which have been carefully inspected, with the following	result:
, 1 ,	
Number of premises inspected	2,982
Number of premises inspected	2,982
Number of premises inspected Number of leaks discovered	2,982
Number of premises inspected	2,982
Number of premises inspected	2,9 ⁸ 2 114 287
Number of premises inspected	2,9 [§] 2 114 287 123

The following table shows the kind, location and number of water fixtures:

WARDS.	Ватнѕ.	CLOSETS.	WASHBASINS.	SINK FAUCETS.	URINALS.	HYDK 1S, SHJ COCKS, AND ST. WASHERS.	MISCELLANE'S.
First.	27	153	21	158	6	361	27
Second	42	256	42	139	7	253	25
Third and Tenth	224	922	193	523	6	1242	162
Fourth and Fifth	51	277	31	245	8	676	47
Sixth and Seventh	22	191	24	109	7	413	26
Eighth and Ninth	28	174	23	143	9	308	33
School and engine houses.	5	18	33	34	17	. 38	57
Total	399	2091	367	1851	60	3291	377
Grand Total.			,		! —		7936

There are also 57 private fire protection lines connected with the public mains.

The meters are read monthly, and in case of excessive use (or waste), premises are carefully inspected, and owner of premises notified of the result of inspection.

Respectfully submitted,

A. PER LEE.

Inspector.

CITY ENGINEER'S REPORT

OFFICE BOARD OF PUBLIC WORKS, GRAND RAPIDS, MICHIGAN, May 1, 1890.

To the Honorable Board of Public Works:

Gentlemen—I have the honor to submit herewith a report of work done during the year ending April 30, 1890; also to include herein some work that has been under contract for two years, but completed during this fiscal year.

STREETS.

Grade lines have been adopted for 18.43 miles of streets, as per table, as follows.

List of streets on which grade lines have been adopted during the year ending April 30, 1890:

STREET.	FROM	то	Lе'тн Беет.
Taylor			2:98
Taylor	Coldbrook	Walbridge	672
Lincoln	Fourth	Walker	2077
Third	Stocking	Lincoln	2586
North Lane	W. Bridge	Fourth	1529
First	N. Front	W. city line	5472
Grand	Lyon	E. Bridge	949
Grand	E. Bridge	North	1750
Lyon	N. Union	Grand	604
Rathbun Pl	S. Waterloo	Hall	2850
Powers	Crosby	Myrtle	629
S. Lafayette	Wealthy	Fifth	2566
Coit	Bradford	Coldbrook	1740
Walbridge			
Hubert			i

STREET.	FROM	то	LE'TH
Walnut	North	N. Union	1262
Shirley	North	N. Union	1262
Hogadone	Butterworth	I. S. & M. S. R. R	735
North East	E. Bridge]ves	1752
Harlan	E. Bridge	North	1750
Harvey	Grand	North Fast	1253
Frank	Canal	Taylor	495
Cole	Marietta	Sweet	604
Ames	North	Briggs Pl	421
Briggs Pl	Quimby	South	106
West Leonard	Alpine	Grand River	3643
Agnew avenue	Sixth	Ninth avenue	928
Cherry	S. Division	S. Ionia	571
North	Sweet	Cedar	3927
Vine	North College	North	598
Logan	Henry	S. Union	594
Morris	Cherry	Wealthy	1258
Campbell Pl	Lyon	South	363
Dexter Pl	E. Bridge	Fairbanks	1634
Crescent Pl	E. Bridge	Crescent ave	324
Scribner	_	North	7790
Fremont		Eleventh	736
Powell	Tefferson avenue		591
Trowbridge	Clancy	N. Lafayette	
Trowbridge	Clinton	West	300
Alley bet. Kent and Ottawa sts	E. Bridge	Hustings	500
Alley bet. Ottawa and Ionia sts	Fairbanks	Trowbridge	
•	Scribner and Turner add	110WD11age	
Alley, block 8	Tanner Taylor add		
Alley, block 4	Hastings	E. Bridge	
Kentalley	N. Union	Grand	
Oak		Grand	605
Innes	N. Union		· 780
Oakland	Fifth		804
"B"	Grandville	•	1677
Legrand	Gill		1916
Bradford	Coit	North College	1040
North Lafayette	D. G. H. & M. R. R		
North Prospect	Bradford	Cedar	
Matilda	Coit	North	1256
North	Cedar	D. G. H. & M. R. R	2072

STREET.	FROM	то	Le'тн Гвет.
Lincoln	Walker	W. Leonard	1610
	Walker		
North Pine	Walker	W. Leonard	2076
Eleventh	Alpine	West	2562
Nagold	Stocking	Tremont	. 687
Pleasant	North	North Union	1261
Kennedy'	South Union	Henry	592
	Eleventh	l .	
Hall	Grandville	W. to G. R. & I. R. R	. 1193
Briggs avenue	Grandville	Sheridan	. 564
Hughart avenue		Sheridan	
Fifth avenue	Grandville	Godfrey	. 931
Sheridan	Hail	North	1574
Caulfield	Hall	North	1578
Prospect Pl	E. Bridge	Hastings	. 613
	Fifth		

There has been an increase in the length of streets of 4.49 miles by platting and street openings. The statement following shows condition of streets, as to improvement in length in miles, as follows:

Graded and paved with wood and stone	5.900
Graded and paved with wood	1.595
Graded and paved with stone (cobble)	1.178
Graded, graveled and gutters paved	53.350
Graded and graveled	32.575
Graded	3.500
Unimproved	54.854
Total	52.952

The foregoing shows the improvement of 5.79 miles of streets that were unimproved, which, together with several streets that have been re-improved, are included in the following table; on streets therein named were laid 6017 lineal feet of stone curbing.

TABLE SHOWING THE STREET AND ALLEY IMPROVEMENTS BROUGHT TO COMPLETION DURING THE YEAR,

AND THE COST THEREOF.

						2	4					•	ÿ					
NAME OF CONTRACTOR.	Mathewson&Kloote	Mathewson&Kloote	1,670 00 . C. Prange	9,730 00 C. Prange	C. Prange	M. Tennis	C. Utes	J. & M. Myers	L. Schneider	R. Pickett	B. Livingston	L. Schneider	W. D. Hembling	M. Tennis	C. Prange	Mathewson&Kloote	B. Livingston	H. Principaal
TOTAL AMOUNT.	\$2,630 00	38,700 00	1,670 00	9,730 00	820 00	1,040 00	100 00 2,100 00	1,430 00	100 00 , 1,830 00	140 00 2,100 00	200 00	3,290 00	1,140 00	118 38 2,000 00	00 1,060 00	2,600 00	200 00 4,100 00	145 00 2,930 00
ESTIMA'D INCI- DENTALS.	\$ 130 00	100 00	107 00	237 00	65 00	94 55	100 00	82 00	100 00	140 00	30 00	127 00	24 00	118 38	67 00	150 00	200 00	145 00
CONTRACT ESTIMA'D INCI- PRICE. DENTALS.	\$ 250 00	38,000 00	1,563 00	9,493 00	755 00	945 45	2,000 00	1,848 00	1,730 00	1,960 00	450 00	3,163 00	1,086 00	1,881 62	998 00	2,450 00	3,900 00	2,785 00
KIND OF IMPROVEMENT,	Graded, graveled and gutters paved	Graded, graveled and gutters paved	Graded, graveled and gutters paved	Graded, graveled and guiters paved	Regraded, graveled and gutters paved	Graded and graveled	Oakland avenue! Graded, graveled and gutters paved	Graded, graveled and gutters paved	S. Division street Graded, graveled and gutters paved, stone curb	Graded, graveled and gutters paved	Graded, graveled and gutters paved	Highland avenue Graded, graveled and gutters paved	Coldbrook street Regraded, graveled and gutters paved	Graded	Repaved with cedar blks, cobble stone gut'rs, stone curb	Regraded and repaved with cobble stone; stone curb	S. East street Graded, graveled and gutters paved	N. Lafa, ette Graded, graveled and gutters paved 2,785 00
TO	North Prospect street Hastings street Fairbanks street	Sweet street	G. R. & D. R. R	N. College avenue.	E. Bridge street	Fourth street		Coit avenue	S. Division street	S. Union street	Henrietta street	Eighland avenue		Stocking street	Spring street	Grand River		N. Lafa, ette
FROM	Hastings street	N. College avenue E. Bridge street	S. Ionia street	Quimby street Taylor street	Ransom street Crescent avenue	W. Bridge street	Fourth avenue Grandville avenue.	Clinton street	McDowell street Jefferson avenue	East street	King Court Plainfield avenue	Fifth avenue	Clancy street Cedar street	Lincoln street	E Fulton street Division street	D. G. H. & M. R. R.	Madison avenue	Fairbanks street W. of Clinton
NAME OF STREET.	North Prospect street	N. College avenue	Sixth avenue S. Ionia street	Quimby street	Ransom street	North Lane avenue. W. I	Fourth avenue	Newberry street Clinton street	McDowell street	Thomas street East street	King Court	Terrace avenue Fifth	Clancy street	Third street Lincoln street.	E. Fulton street	E. Leonard street D. G.	Fifth avenue Madi	Fairbanks street

STREET AND ALLEY IMPROVEMENTS BROUGHT TO COMPLETION DURING THE YEAR --CONTINUED.

NAME OF CONTRACTOR.	1	\$6,850 00 \$ 200 00 \$ 7,050 00 B Livingston	90 00 1,640 00 J. De Bruen	82 00 740 00 L. Schneider	100 00 1,700 00 R. Pickett
		B Ľ;	J. De	L. Sch	R. Pic
CONTRACT ESTIMA'D TOTAL. INCI- PRICE. DENTALS. AMOUNT.		\$ 7,050 00	1,640 00	140 00	1,700 00
ESTIMA'D INCI- DENTALS.		\$ 200 00			100 00
CONTRACT PRICE.		\$6,850 00	1,550 00	658 00	1,600 00
KIND OF IMPROVEMENT.		North avenue E. Leonard Sweet street Graded, graveled and gutters paved	Seventh avenue S. Division Agnew avenue Graded, graveled and gutters paved 1,550 00	Crescent Place Crescent avenue E. Bridge street, Graded, graveled and gutters paved; stone curb 658 00	Powell street Jefferson avenue S. Lafayette street. Graded, graveled and gutters paved; stone curb 1,600 00
TO		Sweet street	Agnew avenue	E. Bridge street	S. Lafayette street .
FROM	-	E. Leonard	S. Division	Crescent avenue	Jefferson avenue
NAME OF STREET.		North avenue	Seventh avenue	Crescent Place	Powell street

SEWERS.

All the sewer construction during the year has been lateral work, composed of vitrified salt glazed pipe.

LOCATION AND COST OF SEWERS-CONTINUED.

NAME OF CONTRACTOR.	\$ 265 00 \$ 75 00 \$ 340 00 F. C. Schneider	300 00 J. De Bruen	210 00 Mathewson&Kloote	390 00 L. Schneider	400 00 80 00 480 00 R. Pickett
Teo.D	\$ 340 00	300 00		390 00	00 08#
ESTIMATED [ACIDEN'LS.	\$ 75 00	236 00 64 00	166 00 +4 00	20 00	80 00
Соиткаст Рисв.	\$ 265 00	2:36 00	166 90	320 00	00 007
рексти ги Рект.	991	550	937	009	683
CATCH- BASINS.	:		:	-:	:
М амног.кs.	_	24	-	C1	84
Size and Kind.	9-inch glazed pipe	9-inch glazed pipe 2	9-inch glazed pipe	9-inch glazed pipe	9-inch glazed pipe
LOCATION OF SEWER.	Alley between Calder street From Cherry street to Oakes street	Alley between Ottawa and From Fairbanks to Newberry street	Alley between Court and From 73 ft. W. of Allen street to Valley street 19-inch glazed pipe 1	From 21 ft. N. of Butterworth ave. to Watson st. 9-inch glazed pipe 2	From S. end of block to Watson street
NAME OF STREET.	Alley between Calder street and Ellsworth avenue.	Alley between Ottawa and N. Ionia streets.	Alley between Court and Mt. Vernon streets	Alley between Gold and Jefferson streets	Alley between W. Broadway and Straight streets.

There is included in the foregoing, sewers to the extent of 2.840 miles. In connection with which work there has been constructed 45 manholes, and 15 catch basins. There has also been constructed in connection with street improvements, 11 catch basins:

The system of sewerage consists of:

Brick sewers	18.358	miles.
Glazed pipe sewers	2.651	"
Wood sewers	1.453	4.4
Iron pipe in river	0. 160	66
Total	22.622	miles.

BRIDGES.

The new bridge construction of the year is comprised in the Clancy street bridge, over Coldbrook creek.

The bridge has a clear span of 30-feet, an 18-foot roadway, and one six-foot sidewalk. Girders for the bridge are 15-inch I beams. Roadway floor of white oak, on white pine joists.

The bridge rests upon abutments of stone masonry.

The entire work was included in the contract, which was awarded June 1, 1889, to John Olson, for \$1,300. Extra work to the amount \$14.50 was performed.

The repair of the river bridges came to the Board by resolution of the Council, and on an inspection thereof it was found that Leonard, Sixth, Pearl and Fulton street bridges needed attention. Leonard and Sixth street bridges had lateral bracing tightened, the piers pointed up, and otherwise repaired. Pearl street bridge roadway was replanked, and the lateral systems of bracing this and Fulton street bridges were readjusted.

Timber for replanking Fulton street bridge is contracted for, and the Pearl, Sixth and Fulton street bridges will be repainted. The cost of the repairs made has been as follows:

Leonard street bridge piers	\$ 235	00
Adjusting lateral bracing, etc	30	07
Replanking Pearl street bridge floor, timber, labor and		
other material	1,916	79
Repairs of Fulton street bridge floor	45	27
Readjusting all iron bridges	182	07
Repointing masonry of iron bridges	52	42
Paint purchased	291	05
Total	* 0 ==0	6-

WATER WORKS.

A large amount of work in connection with this branch of the public works has been performed.

A new and larger pump put in place for high service duty, a new boiler procured to take the place of the first one constructed, which, after 13 years service had become unsafe; the high service force main laid, a stand pipe erected, a filtration plant constructed, and considerable extensions made to the system of distribution mains.

The mains embraced in the contracts under the \$150,000 loan have been laid, as appears in the following table, which supplements that included in the last annual report.

STREEL	FROM	то	DIAM'TER INCHES.	LENGTH IN FEET.	No. of VALVES.	No of Hydr'ts.
N. Front	W. Bridge	Fifth	8	1925	2	6
N. Front	Eighth	W. Leonard	6	1158	. 2	!
N. Front	Eighth	W. Leonard	4	1291	1	5
Turner	W. Leonard	Webster	4	1850	2	3
N. Jefferson	W. Bridge.	Third	4	1178	2	2
Second	Broadway	Stocking	4	1573	3	. 3
Third	Seward	Stocking	6	1023	2	3
Court	Shawmut	W. Fulton	6	954	2	2
S. Jefferson	W. Fulton	Butterworth	4	1167	1	1
Watson	Straight	Shepard	6	1277	3	4
Peaslee	Straight	Gunnison	. 4	1010	2	3
N. College	Lyon	Hastings	6	1713	2	1
Caledonia	Plainfield	Taylor,	4	1040	2	1
N. Coit	Quimby	Sweet	6	867	1	2
Plainfield	Quimby	Sweet	8	956	1	3
Taylor	E. Leonard	Quimby	6	1722	2	3
Quimby	Plainfield	Reed	6	533	1	1
Reed	Quimby	Madison	4	441		١
Perry	Quimby	Page	4	1038	' 1	· 1
E. Leonard	Plainfield	Holcomb	6	1279	1	3
Coit	Trowbridge	Fairbanks	6	573	١	1
Livingston	E. Bridge	Hastings	4	580	1	٠
Fifth	Buchanan	S. Lafayette	8	281		· · ·
Fifth	Buchanan	S. Lafayette	10	1244	2	3
Fifth	Buchanan	S. Lafayette	12	1322	1	1

STREET.	FROM	то	DIAN'TER INCHES.	LENGTH IN FRET.	No. of	No. or Hydray
Cass	Morrison	Fifth	6	2635	3	4
Cass	Morrison	Fifth	4	634	1	1
McDowell	S. División	Jefferson avenue	4	940	2	
Sycamore	S. Division	Jefferson	۱ 4	957	2	l ••
Morrison	S. Lafayette	Jefferson	١,	633	2	1
S. Ionia	Fifth	Hall	6	2641	4	8
Wealthy	S. Lafayette	S. East	12	2630	2	6
Wealthy	S. Lafayette	S. East	10	883	2	3
Madison	Cherry	Fifth	4	1323	1 2	1
Madison	Cherry	Fifth	6	2622	3	4
Terrace	Wealthy	Logan	4	659	1	1
James	Wealthy	S. of Logan	4	810	1	1
S. Lafayette	Fitth	Highland	6	1831	2	4
E. Fulton	S. College	N. East	10	1827	1	3
Lake	S. Union	Packard	6	903	1	1
Lake	S. Union	Packard	4	44		١
Grove	Plainfield	Taylor	4	809	2	3

At the last session of the State legislature a special act was passed, authorizing the Common Council to borrow \$80,000, to be expended by the Board of Public Works in the erection of a stand pipe, removal of Wyckoff pipe, and substituting iron pipe therefor, and the laying of connecting mains.

In conformity with the requirements embraced in the foregoing conditions, plans were immediately prepared.

With the views entertained for the future improvement of the public grounds about the reservoir, no desirable location for the stand pipe was found thereon. A lot adjoining the grounds was authorized to be purchased by the Common Council at the price named in the recommendation of the Board, viz., \$576.00.

Plans for a stand pipe of wrought iron, 30 feet in diameter and 100 feet high were prepared, but at present to be built to a height of 75 feet. There is an overflow pipe 12 inches in diameter, secured by brackets to the interior of the stand pipe, extending to a height of 71 feet. The overflow pipe passes out through the lower ring of the stand pipe, and connects with reservoir or low service system of mains.

Bids for the stand pipe construction were opened April 13, 1889, and the contract awarded to the Porter Manufacturing Co., Limited, of Syracuse, N. Y., for \$9,100. A small amount of extra work increased the cost to \$9,133.25.

The foundations for the stand pipe is a mass of concrete nine feet in depth, with a diameter at bottom of 36 feet, which, in a height of four feet, is reduced to 33½ feet diameter. At a point four feet below the top of the foundation is set a course of Bedford, Indiana, stone, which has 2½ feet depth of face and same bed. Upon this course rests the coping, which is 18 inches thick with a bed of four feet, and projecting beyond the lower course three inches. This work was done by Mr. A. C. Sekell, on a contract awarded April 29, 1889, for \$2,190.

The inflow and overflow pipes, above ground, are protected from frost by a brick structure, having hollow walls. The building is 17 x 17 feet, and cost \$170.

The division of the distribution mains into high or hill, and low service systems, (one being under stand pipe and the other under the reservoir pressure), has necessitated several changes in the original pipe system.

Several of the old lines removed, the most of which being the Wyckoff pipe, have been replaced with iron pipe of greater diameter. The iron pipe removed to be replaced with larger mains, has been relaid in other streets.

The high service force main is 16 inches in diameter, extending from the pump-house, in Coldbrook and Clancy streets, to East Bridge street; thence east to North Lafayette street; thence south to Lyon street; thence east to North College avenue; thence south to Logan street; from which point it will be extended at some future time. At Bradford street a line is laid from the Clancy street main of same diameter, west in said street over private ground, and across the reservoir grounds to the stand pipe.

The new main from the reservoir to the low service is 20 inches in diameter. Connection was made with the outlet pipe from the reservoir, in Livingston street at Newberry street, thence west in Newberry street to North Ionia street, thence north to the force main leading to the reservoir, and south to East Bridge street. A 16-inch main was laid in said last mentioned street, from North

Ionia street west, and at Ottawa street connected with a 12 inch and 10-inch line; and of the same size, laid east to North Division street; thence continued south to Monroe street, connecting there with the 12-inch main in said street last mentioned, and the 12-inch main in South Division street.

In both East Bridge and North Division streets 12-inch Wyckoff pipe was abandoned.

The six inch Wyckoff pipe lines in Pearl and North Ionia streets, south therefrom, are relaid with 10-inch iron mains.

TABLE SHOWING THE WORK OF PIPE LAYING DONE UNDER THE CONDITIONS OF THE \$80,000 LOAN.

IN INCIRES. LEMOTH IN FERET. NO OF HYDRAUTS, HYDRAUTS, REMARK	5 1291 1 2 High service force main	16 3834 2 Removed 180 feet 6-inch iron pipe	8 325 1 Removed 10-inch cast iron pipe	6 1054 1 Removed 546 feet Wyckoff pipe	8 1319 1 Removed Wyckoff pipe	8 869 Removed Wyckoff pipe	6 1873 1 4 Removed Wyckoff pipe	4 382 1 Removed Wyckoff pipe	8 554 Removed Wyckoff pipe	0 2754 2 4 Removed 566 feet 8-inch iron pipe	881 1 Removed 529 feet 8-inch iron pipe.	8 1073 2 1 Main to stand pipe	2 348 1 Discharge into low service	s 905 1 2 Removed Wyckoff pipe	5 522 1 2 Removed Wyckoff pipe	3 254 1 Removed Wyckoff pipe	2448 3 4 Removed Wyckoff pipe.	8 881 2 1 Removed Wyckoff pipe	
Пламетек и јаснез.	16	16	91	9 <u>1</u>	- 18 	• - :	• :::	- -	•• 	30	£	91 – :	12	æ	16		16	9	
ξ	Clancy	E. Bridge	N. Lafayette	Lyon	N. College	Ransom	Newberry	Coit	E. Bridge	E. Bridge	Livingston	Standpipe		Seward	N. Division	. Clinton	. Monroe	Ransom	
FROM	N. Ionia	Coldbrook	Clancy	E. Bridge	N. Lafayette	N. Lafayette	Hastings	Livingston	Hastings	Mason	N. Ionia	Clancy		Broadway	Ottawa	N. Division	E. Bridge	N. Division.	
STREET.	Coldbrook	Clancy	E Bridge	N. Lafayette	Lyon	Lyon	Livingston	Hastings	Coit	N. Ionia	Newberry	Bradford	Overflow from Standpipe	Fifth	E. Bridge	E. Bridge	N. Division	Lyon	

TABLE SHOWING WORK OF PIPE LAYING UNDER CONDITIONS OF LOAN-CONTINUED.

VALVES, SA AND AND AND AND AND AND AND AND AND AN	1 1 Removed Wyckoff pipc	2 Removed Wyckoff pipe	4 Removed Wyckoff pipe	3 Removed Wyckoff pipe	Removed Wyckoff pipe	2 Removed Wyckoff pipe	1 Removed Wyckoff pipe	7 Removed Wyckoff pipe	7 Removed Wyckoff pipe	Removed Wyckoff pipe
FRET. No. OF	1520	1028 2	98	94 3	808	189 2	205	- 36	- 17	577
IN INCHES.	6 15	8 10	10 1386	9 - 01	 	-	9	12 2036	1277	
O	E. FultonLyon	Monroe	N. Division Campati	N. Ionia	Summer	100 feet east of Front Stocking stocking	W. Bridge Stocking Stocking	100 feet east of Front Stocking	. Sibley	E. Leonard Plainfield 12
FROM	E. Fulton	E. Fulton	N. Division	Pearl	S. Front	100 feet east of Front	100 feet east of Front	100 feet east of Front	W. Bridge	N. Ionia
STREET.	Lafayette	N. Waterloo Monroe E. Fulton	Pearl	N. Ionia	Shawmut	W. Bridge	W. Bridge	W. Bridge	S. Jefferson	F. Leonard

In response to several petitions asking that water mains be laid, the Board on the 8th of July last, recommended to the Council the laying of certain lines, which was concurred in, and the necessary transfer made.

In this connection mains have been laid in the streets named in the following table:

STREET.	FROM	то	DIMAT'R INCHES.	LENGTH IN FRET.	No. OF VALVES.	No. or Hydr'ts
Paris	Logan	Mills	4	876	1	1
Julia	N. Union	Grand	! 4	555	1	1
Mt. Vernon	Shawmut	Valley	4	1113	1	2
Wealthy	Grandville	S. Waterloo	. 8	1342	2	2
Center	Monson	Hall	6	834	1	2
Fitth	Seward	McReynolds	8	252	1	1
Fifth	Seward	McReynolds	, 4	767		2
Plainfield	Coldbrook	E. Leonard	6	942	2	1
Page	Plainfield	North	, 6	1795	3	5
Carrier	North	N. College	6	657	1	1
Powell	Jefferson	S. Lafayette	4	657	1	1
E. Bridge	N. College	N. Union	8	662	1	2
Brainard	E. Bridge	D. G. H. & M. R. R	4	1064	1	2
N. Union	E. Bridge	D. G. H. & M. R. R	4	862	1	2
Barclay	Lyon,	Fountain,	٠ ،	732	2	2
Mechanic	N. Union	Grand	. 4	540	1	2
Thomas	S. Union	Henry		656	1	
Lake	Packard	East	6	543	1	1
North	Hastings	Trowbridge	6	537		1

Abandonment of the creek supply necessitated a change of suction of the old south pump to the river supply. To make this change a new pump well was constructed near the old one, and connected therewith, a gate being placed in the connection that it might be cut out should it be necessary. The well is 20 feet in diameter, and 21 feet deep. It was constructed by Richard Pickett, on a contract awarded April 27, 1889, for \$1,450, which, by reason of some extra work done, amounting to \$54.07, increased the cost to \$1,504.07.

The filter bed constructed in 1888, proved so much of a success

that it was decided to construct another and larger one, after plans which were prepared under the special direction of the Board.

The bed was made by excavating in the rock bed, five feet below the general level of the bottom of the river. The excavation is, in average width, 45 feet, and of 460 feet length. Within this excavation was placed three lines of collecting galleries. The collectors are 24 by 24 inches in inside dimensions, and constructed of hemlock fencing, each course separated from one adjoining by half inch strip, placed at intervals of 12 inches. A cover of two courses of two-inch plank was laid with close joints, and securely spiked to sides.

The three were joined together at one end, and from thence a connection was made with the conduit leading to the pump well.

After the collectors were placed in the excavation, the pit was filled with the following described material, in the order named:

Stone broken to from two to four inches	24 inches.
Gravel screened to one inch	6 inches.
Gravel screened to one-half inch	6 inches.
Gravel screened to one-fourth inch	6 inches.
Gravel screened to one-eighth inch	6 inches.

The work was completed about October 1st, and water turned into the pump well.

Samples of water taken from the river supply, and from the much lauded "silver springs" well, from which a few of our citizens are supplied by the Hydraulic Company, were sent to Dr. Kedzie, of the Agricultural College, and to Prof. Vaughan, of the University, for examination. Dr. Kedzie says:

"The waters are so nearly identical in composition that there is little choice between them for domestic use. The similarity is remarkable, and I have never seen a similar one."

Prof. Vaughan says: "Owing to the greater number of germs in the city water, the other sample is better for 'drinking purposes.'"

And says further: "It must not be inferred that these germs are necessarily capable of producing disease in man."

The filter bed was constructed by A. C. Sekell, on a contract awarded May 18, 1889, for which work \$11,581.50 was paid.

To meet the demand for water on the high level district, which was likely to exceed the capacity of the Gordon & Maxwell pump,

which was only intended for auxiliary service, the Board purchased of Fairbanks, Morse & Co., of Chicago, Ill., a Smith-Vaile pump of 2,500,000 gallons daily capacity. The pump has been in service since about July 8 of last year.

The contract price for the pump was \$8,500, on which there has has been paid \$7,000.

To furnish the additional power required for the increased pumping capacity, and to supply the loss occasioned by removing the old boiler, a Babcock-Wilcox boiler was purchased at a cost of \$3,935.

Much other work has been done at the pumping station; changing ends with the remaining old boiler, extension to coal shed, procurement of scales, etc., for handling and weighing coal, etc.

PARKS.

At a session of the Common Council held June 10, the Board was instructed to prepare plans for the improvement of Lincoln park. The plans therefor prepared in this office by Mr. Sekell not meeting the approval of the Board, they opened correspondence with Mr. O. F. Dubois, park engineer of Chicago, and were by the Council authorized to employ said Dubois to prepare plans for the park improvement. August 12th the plans were submitted to the Council, and by that body approved on the 15th.

The Board having been authorized by the Council to expend \$1,500 toward the improvement of the park, early in November the city engineer was instructed to employ men and teams and commence work thereon.

The plans for the improvement include two large bedding places, summer house on the bank of an artificial lake, numerous gravel walks, fountain, and site for a Lincoln monument.

The bedding places having several large trees therein, many of which having dead wood in them, all were ordered removed; as were other defective trees on the ground. The walks were outlined and considerable grading done. The work of grading consisting only in filling depressions, leveling off knolls, and a general smoothing up of the surface; not reducing it to a plane as contemplated in the plan, but preserving a gently undulating appearance.

Work of this character to the amount of \$1,174.49 was performed before the close of the season.

The Board was also instructed to lay pipe in the park for sprinkling purposes. Plans for this work are prepared, and the pipe ordered, together with necessary lydrants, valves, etc., to be laid this season.

SUMMARY.

Street improvements have cost \$ 80,800 00
Sewers
Bridges 1,314 50
Bridge repairs
Water works 125,918 15
Parks 1,174 49
Total\$222,658 11
Total
Engineering expenses in connection with the foregoing work,
Engineering expenses in connection with the foregoing work, not including superintendence, has been:
Engineering expenses in connection with the foregoing work, not including superintendence, has been: For salaries, engineer and assistants
Engineering expenses in connection with the foregoing work, not including superintendence, has been: For salaries, engineer and assistants

H. A. Collar, City Engineer.

39
EAST SIDE WATER MAINS—LOW SERVICE.

STREET	FROM	то	DIAM. IN INCHES.	LENGTH CAST IRON	LENGTH	TOTAL
Barclay	Lyon	East Fulton	4	1557		1557
Bostwick	Lyon	Fountain	4	689		689
Bartlett	Ellsworth	South Waterloo	4	1128	.	1128
Blakeley	Lagrave	Sheldon	6	328		328
Buchanan	Prescott	Wealthy	8	660		660
Canal	Pearl	East Bridge	10	1496		
Canal	East Bridge	Trowbridge	8	1167		
Canal	Pump Station	East Leonard	12	814		
Canal	East Leonard	North City Line	8	2602		6079
Calder	East Fulton	Cherry	6	1288		1288
Carrier	Plainfield	North College	6	2617		2617
Campau	Pearl	Louis	6	386		
Campau	Louis	County Jail	4		57	443
Coldbrook	Ottawa	Taylor	6	628		628
Colfax	North Coit	Taylor	4	1119	¦	1119
Campau Alley (so called)			6	365 212		577
Cherry	Ellsworth	South Division	8	1526		
Cherry	Jefferson	South Lafayette	8		658	2184
Caledonia	Plainfield	Taylor	4	1040	¦	1040
Cass	Morrison	Wealthy	4	634	ļ	
Cass	Wealthy	Fifth	6	2635		3269
Center	Blakeley	Hall	6	4280		4230
Chestnut	Grandville	Godfrey	4	1250		1250
Ellsworth	East Fulton	Cherry	12	1306	ļ	·
Ellsworth	Cherry	Wealthy	8	1380	l	2636
Eighth Avenue	South Division	South Ionia	4	660		660
Eleventh Avenue	South Division	South Ionia	4	660		660
East Bridge	Canal	Ottawa	12	605	: . •• ••	
East Bridge	Ottawa	North Division	16	522		1127
East Fulton	Grand River	South Division	12	1842	· · · · · · ·	!
East Fulton	South Division	South Lafayette	10	1627	·	3469
Erie	Canal	Mill	4	300		300
East Leonard	Canal	Plainfield	12	942		
East Leonard	Plainfield	Holcomb	6	1279		2221
Fountain	North Division	Barclay	4	1158		1153
First Avenue	South Division	South Ionia	4	660		660
Fourth Avenue	South Division	Buchanan	4	1290		1290
Fifth Avenue	Buchanan	South Division	12	1822	,·····	

EAST SIDE WATER MAINS-LOW SERVICE-CONTINUED.

STREET	FROM	то	DIAM, IN INCHES	LENGTH CAST IRON	LENGTH	TOTAL LENGTH
Fifth Avenue	South Division	Cass	10	1244		
Fifth Avenue	Cass	Terrace	8	657		3223
Finney	Wealthy	Williams	6	1015		1015
Goodrich	Grandville	South Waterloo	4	1197		1197
Grandville	Goodrich	Fifth Avenue	12	3189		3189
Grove	Plainfield	Taylor	4	809		809
Hilton	Prescott	' Fifth	6	2112		2112
Hastings	Kent	West to Alley	6		135	135
Huron	Canal	Mill	4	294		294
Jefferson Avenue	East Fulton	Wealthy	6	46	2594	
Jeffer:on Avenue	Wealthy	Hall	6	5285	,	7925
Kent	Lyon	East Bridge	6	1040		
Kent	East Bridge	Trowbridge	6		1169	
Kent	Trowbridge	Mason	6	1701		3910
Kent Alley	Lyon	East Bridge	4	1130		1130
Lagrave	East Fulton	Wealthy	6	2640		.
Lagrave	Wealthy	Blakeley	4	1037		3677
Livingston	Reservoir	Newberry	20	349		849
Louis	North Waterloo	Campau	8	430		430
Lyon	Grand River	Canal	6	469		
Lyon	Canal	North Division	10	1116		
Lyon	North Division	Ransom	6	881		2466
Madison	Plainfield	North	6	1433	 .	1433
Morrison	South Lafayette	Jefferson	4	633		633
Mason	Reservoir	Grand River	16	1750		1750
Monroe	Pearl	Ottawa	10	692		
Monroe	Ottawa	North Division	12	801		
Monroe	North Division, east		8	98		1591
Mill	Huron, north	·····	4	332		332
McDowell	Jefferson	South Division	4	940		940
North Ionia	Coldbrook	Mason	8	1420		
North Ionia	Mason	East Bridge	20	2820		
North Ionia	Pearl	Monroe	10	694		
North Ionia	Monroe	East Fulton	6		585	5519
North Division	East Bridge	Monroe	16	2448		
North Division	Monroe	East Fulton	12	163		2611
North Coit	Quimby	Sweet	6	867		867
North Avenue	Fast Bridge	Trowbridge	6.	1268		1268

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EAST SIDE WATER MAINS—LOW SERVICE -CONTINUED.

STREET	FROM	то	DIAM. IN	CAST IRON	LENGTH	TOTAL
Ninth Avenue	South Division	M. C. R R. Grounds	6	1945		1945
Newberry	North Ionia	Livingston	20	881	 .	881
North Waterloo	Monroe	East Fulton	8	1049		1049
Ottawa	Canal	Mason	24	1590		
Ottawa	Mason	East Fulton	12	4836		6426
Pearl	North Division	Campau	10	1386		
Pearl	Campau	Grand River	6	260		1646
Prescott,	South Division	Buchanan	8	1325	 .	1325
Perry	Quimby	Page	4	657	. .	657
Page	Plainfield	North	6	1795		1795
Powell	Jefferson	South Lafayette	4	657		657
Plainfield	Coldbrook	East Leonard	6	942		
Plainfield	East Leonard	Sweet	8	2911		3858
Quimby	Canal	Reed	6	2296		2296
Ransom	Lyon	East Fulton	4	1534	j	1534
Reed	Quimby	Madison	4	441		ļ .
Reed	Carrier	Page	1	365		806
Second Avenue	South Division	Buchanan	4	1383		i
Second Avenue	Grandville, west		4	525		1908
Sixth Avenue	South Division	South Ionia	4	660		660
Seventh Avenue	South Division	South Ionia	4	660		660
Sheldon	East Fulton	Oakes	6	860		; ;
Sheldon	Oakes	Blakeley	4	2805		3665
Sycamore	South Division	Jefferson	4	957		957
South Division	East Fulton	Fifth	12	5274		· • • • • • •
South Division	Fifth	Hall	8	2636		7910
South Ionia	East Fulton	Oakes	6		828	!
South Ionia	Oakes	Hall	6	7077		7905
South Lafayette	East Fulton	Cherry	4		1318	
South Lafayette	Cherry	Logan	6	1968	 	١
South Lafayette	Logan	Sycamore	4	1436		
South Lafayette	Sycamore	Highland	6	2386		7103
Taylor	East Leonard	Quimby	6	1722	¦	1722
Trowbridge	Canal	Kent	8	305	١	305
Third Avenue	South Division	Buchanan	4	1274		1274
Twelfth Avenue	South Division	South Ionia	4	660	· · · · · ·	660
Wealthy	Buchanan	South Waterloo	8	1868	١	
Wealthy	South Division	Terrace	10	2003	,· · · · · ·	3871

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WEST SIDE WATER MAINS—LOW SERVICE.

						
STREET.	FROM	то	DIAM'TR INCHES.	CAST IRON Pipe.	WYCKOFF PIPE.	TOTAL LRNGTH.
Allen	Summer	Winter	8		295	295
Broadway	W. Bridge	W. Leonard	12	5257		
Broadway	W. Leonard	Webster	10	1834		7091
Butterworth	S. Front	River avenue	8	2269		2269
Court	W. Fulton	Shawmut	6	984		984
Eighth	Broadway	Grand River	16	973		973
Fourth	Broadway	Seward	8	846		١
Fourth	Seward	N. Lane avenue	6	2660		3506
Fifth	Broadway	Muskegon	8	1157	• • • •	
Fifth	Muskegon	McReynolds	4	767		1924
First	Michigan	N. Pine	4	1506		1506
Gold.,	W. Bridge	W. Fulton	4	2645		, ,
Gold	W. Fulton	Watson	8	684		
Gold	Watson	Butterworth	4	669		3948
Jackson	Straight	S. Pine	6	1665		1665
Michigan	W. Bridge	Second	6	835		
Michigan	Second	Fourth	4	742		1577
Mt. Vernon and alley	Shawmut	Valley	4	1113		1113
North Front	W. Bridge	Fifth	6	1925		
North Front	Eighth	Eleventh	6	1158		
North Front	Eleventh	W. Leonard	4	1291		4374
North Jefferson	W. Bridge	Third	4	1178		1178
North Pine	W. Bridge	Second	6	819		819
Peaslee	Straight	Gunnison	4	1010		1010
Summer	W. Bridge	W. Fulton	4	336	2298	2634
Second	Broadway	Stocking	4	1573		1573
Seventh	Broadway	Stocking	10	2880		2830
Seward	Fourth	Fifth	6	404		404
Scribner	W. Bridge	Eighth	6		2839	
Scribner	Eighth	Webster	8		4238	7077
Shawmut	S. Front	Winter	6	1095		
Shawmut	Winter	S. Jefferson	6		709	
Shawmut	S. Jefferson	Straight	6	986		2782
Stocking	W. Bridge	Fourth	8	1878		
Stocking	Fourth	Seventh	6	1273		8151
Straight	W. Bridge	Jackson	6	989		•••
Straight	Shawmut	Watson	6	1671		
Straight	Watson	Butterworth	8	832		3492
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WEST SIDE WATER MAINS—LOW SERVICE—CONTINUED.

STREET.	FROM	то	DIAM'TR INCHES.	CAST IRON PIPE.	Wускорг Ріре.	TOTAL LENGTH.
South Front	W. Bridge	Shawmut	6		1670	
South Front	W. Fulton	Butterworth	12	1389		
South Front	Butterworth	Baldwin	8	1026		4085
South Jefferson	W. Bridge	Butterworth	4	8810		8810
South Pine	W. Bridge	Jackson	6	1004		1004
Third	Broadway	Seward	4		824	
Third	Seward	Stocking	6	1028		1847
Turner	W. Bridge	Second	6	774		
Turner	Second	Fifth	4	1147		···
Turner	Fifth	Eleventh	6	2014		
Turner	Eleventh	Webster	4	3142		7077
West Bridge	N. and S. Front, east	•••••	4	189		
West Bridge	N. and S. Front	Fremont	12	3931		
West Bridge	Fremont	Lincoln	8	1406		5226
West Fulton	Grand River	Winter	12	1129		
West Fulton	Winter	Gold	8	938		
West Fulton	Gold	Indiana	12	1215		
West Fulton	Indiana	Gunnison	10	647		3929
West Leonard	N. Front	Scribner	8	270		
West Leonard	Scribner	Alpine	12	3158		3428
West Broadway	W. Bridge	Butterworth	4	4026		4026
Watson	Gold	Straight	8	656		
Watson	Straight	Shepard	6	1277		1933
Winter	W. Bridge	W. Fulton	12	2630		2630
,		•				

PIPE NOT AVAILABLE FOR TAPPING.	DIAM. IN INCHES	LENGTH IN FERT
River Main, Fulton Street.	12	674
River Main, between Mason and Eighth	6	780
Force Mains, Low Service Pumps to Street	20	135
Force Mains, Low Service Pumps to Street	18	125
Force Mains, Low Service Pumps to Street	10	115
Force Mains, High Service Pumps to Street	16	100
Blow-off, Canal Street near pump house	4	60
Blow-off, Clancy Street at Cedar Street	4	37
Blow-off, Ottawa Street at Walbridge	6	66
Blow-off, Mason North Ionia, River Waste	12	
Pump Station Supply Pipes (old)	20	72
Pump Station Suction Pipes to Wells	20	220
Pump Station Suction Pipes to Wells	16	50
Hydrant Connections	6	5574
Standpipe Overflow	12	348

45
EAST SIDE WATER MAINS—HIGH SERVICE.

STREET	FROM	то	DIAM. IN	LKNGTH	TOTAL
Barclay	East Bridge	Crescent	14	496	
Barclay	Crescent	Lyon	4	547	1048
Brainard	East Bridge	D., G. H. & M. R. R	4	1064	1064
Bradford	Clancy	Stand Pipe	16	1078	1078
Crescent	Crescent Park	Ransom	6	422	
Crescent	Barclay	North Lafayette	14	509	·
Crescent	North Lafayette	Benson	6	2433	8864
Coldbrook	Pump House	Clancy	16	2013	2018
Clancy	Coldbrook	East Bridge	16	3834	3684
Clinton	East Bridge	Newberry	6	2811	2311
Coit Avenue	In East Bridge		14	68	ļ
Coit Avenue	East Bridge	Fairbanks	6	1690	1758
Cherry	South Lafayette	South East	8	3305	8305
Charles	Cherry	Wealthy	4	1426	1426
East Fulton	South Lafayette	South Prospect	10	470	
East Fulton	North College	North East,	10	1827	2297
East Bridge	North Division	Clinton	6	254	į
East Bridge	Clinton	Coit	12	721	·
East Bridge	Coit	Barclay	14	249	į
East Bridge	Barclay	Clancy	10	195	'
East Bridge	Clancy	North Lafayette	16	325	l
East Bridge	North Lafayette	North College	10	1320	
East Bridge	North College	North Union	8	662	3726
Fountain	Barclay	North Lafayette	4	501	
Fountain	North Lafayette	Grand	6	2588	3089
Fifth Avenue	Terrace	Madison	8	358	l
Henry	Cherry	Wealthy	4	1389	
Henry	Wealthy	Thomas	6	1973	3362
Hastings	Coit	Livingston	4	405	405
Holbrook	Packard	South East	4	463	463
Innes	North Union	Grand	4	652	652
James	Cherry	South of Logan	4	2182	2182
Julia	North Union	Grand Avenue		555	535
Kellogg	South Union	Packard	4	820	820
Livingston	North of Newberry	l i	6	1873	
Livingston	Hastings	East Bridge		580	2453
Lyon	Ransom	North Lafayette	6	868	
			v	300	;

PIPE NOT AVAILABLE FOR TAPPING.	DIAM. IN INCHES	LENGTH IN PERT
River Main, Fulton Street	12	674
River Main, between Mason and Eighth	6	780
Force Mains, Low Service Pumps to Street	20	135
Force Mains, Low Service Pumps to Street	18	125
Force Mains, Low Service Pumps to Street	10	115
Force Mains, High Service Pumps to Street	16	100
Blow-off, Canal Street near pump house	4	60
Blow-off, Clancy Street at Cedar Street	4	87
Blow-off, Ottawa Street at Walbridge	6	66
Blow-off, Mason North Ionia, River Waste	12	
Pump Station Supply Pipes (old)	20	72
Pump Station Suction Pipes to Wells	20	220
Pump Station Suction Pipes to Wells	16	50
Hydrant Connections	6	5574
Standpipe Overflow	12	348

45
EAST SIDE WATER MAINS—HIGH SERVICE.

STREET	FROM	ТО	DIAM. IN	LENGTH	TOTAL
Barclay	East Bridge	Crescent	14	496	
Barclay	Crescent	Lyon	4	547	1043
Brainard	East Bridge	D., G. H. & M. R. R	4	1064	1064
Bradford	Clancy	Stand Pipe	16	1078	1078
Crescent	Crescent Park	Ransom	6	422	
Crescent	Barclay	North Lafayette	14	509	·
Crescent	North Lafayette	Benson	6	2433	3364
Coldbrook	Pump House	Clancy	16	2013	2013
Clancy	Coldbrook	East Bridge	16	8834	8684
Clinton	East Bridge	Newberry	6	2311	2811
Coit Avenue	In East Bridge		14	68	
Coit Avenue	East Bridge	Fairbanks	6	1690	1758
Cherry	South Lafayette	South East	8	8305	8305
Charles	Cherry	Wealthy	4	1426	1426
East Fulton	South Lafayette	South Prospect	10	470	
East Fulton	North College	North East	10	1827	2297
East Bridge	North Division	Clinton	6	254	
East Bridge	Clinton	Coit	12	721	ļ
East Bridge	Coit	Barclay	14	249	
East Bridge	Barclay	Clancy	10	195	1
East Bridge	Clancy	North Lafayette	16	325	l
East Bridge	North Lafayette	North College	10	1320	
East Bridge	North College	North Union	8	662	8726
Fountain	Barclay	North Lafayette	4	501	
Fountain	North Lafayette	Grand	6	2588	3089
Fifth Avenue	Terrace	Madison	8	358	l
Henry	Cherry	Wealthy	4	1389	
Henry	Wealthy	Thomas	6	1973	3362
Hastings	Coit	Livingston	4	405	405
Holbrook	Packard	South East	4	463	463
Innes	North Union	Grand	4	652	652
James	Cherry	South of Logan	4	2182	2182
Julia	North Union	Grand Avenue	4	555	555
Kellogg	South Union	Packard	4	820	820
Livingston	North of Newberry	Hastings	6	1873	
Livingston	Hastings	East Bridge	4	580	2453
Lyon	Ransom	North Lafayette	6	868	
•					

PIPE NOT AVAILABLE FOR TAPPING.	DIAM. IN	LENGTH IN FEET
River Main, Fulton Street	12	674
River Main, between Mason and Eighth	. 6	780
Force Mains, Low Service Pumps to Street	. 20	185
Force Mains, Low Service Pumps to Street	. 18	1 2 5
Force Mains, Low Service Pumps to Street	10	115
Force Mains, High Service Pumps to Street	. 16	100
Blow-off, Canal Street near pump house	.i 4	60
Blow-off, Clancy Street at Cedar Street	. 4	37
Blow-off, Ottawa Street at Walbridge	. 6	66
Blow-off, Mason North Ionia, River Waste	. 19	
Pump Station Supply Pipes (old)	. 20	72
Pump Station Suction Pipes to Wells	. 20	220
Pump Station Suction Pipes to Wells	. 16	50
Hydrant Connections	. 6	5574 -
Standpipe Overflow	., 12	348

45
EAST SIDE WATER MAINS—HIGH SERVICE.

STREET	FROM	то	DIAM. IN	LENGTH	TOTAL
Barclay	East Bridge	Crescent	14	496	
Barclay	Crescent	Lyon	4	547	1043
Brainard	East Bridge	D., G. H. & M. R. R	4	1064	1064
Bradford	Clancy	Stand Pipe	16	1078	1073
Crescent	Crescent Park	Ransom	6	422	
Crescent	Barclay	North Lafayette	14	509	·
Crescent	North Lafayette	Benson	6	2433	3364
Coldbrook	Pump House	Clancy	16	2018	2013
Clancy	Coldbrook	East Bridge	16	8834	8684
Clinton	East Bridge	Newberry	6	2311	2811
Coit Avenue	In East Bridge		14	68	
Coit Avenue	East Bridge	Fairbanks	6	1690	1758
Cherry	South Lafayette	South East	8	3305	8305
Charles	Cherry	Wealthy	4	1426	1426
East Fulton	South Lafayette	South Prospect	10	470	
East Fulton	North College	North East	10	1827	2297
East Bridge	North Division	Clinton	6	254	ļ
East Bridge	Clinton	Coit	12	721	ļ . .
East Bridge	Coit	Barclay	14	249	İ
East Bridge	Barclay	Clancy	10	195	ļ
East Bridge	Clancy	North Lafayette	16	325	ļ
East Bridge	North Lafayette	North College	10	1320	ļ
East Bridge	North College	North Union	8	662	8726
Fountain	Barclay	North Lafayette	4	501	
Fountain	North Lafayette	Grand	6	2588	3089
Fifth Avenue	Terrace	Madison	8	358	
Henry	Cherry	Wealthy	4	1389	j
Henry	Wealthy	Thomas	6	1973	3362
Hastings	Coit	Livingston	4	405	405
Holbrook	Packard	South East	4	463	463
Innes	North Union	Grand	4	652	652
James	Cherry	South of Logan	4	2182	2182
Julia	North Union	Grand Avenue	4	555	555
Kellogg	South Union	Packard	4	820	820
Livingston	North of Newberry	Hastings	6	1873	
Livingston	Hastings	East Bridge	4	580	2453
Lyon	Ransom	North Lafayette	6	868	ļ
Lyon	North Lafayette	North College	16	1319	1

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EAST SIDE WATER MAINS—HIGH SERVICE.—CONTINUED.

STREET	FROM	то	DIAM. IN	LENCTH	TOTAL 1.RNGTH
Lyon	North College, east		8	41	2228
Lake Avenue	South Union	South East	6	1440	1440
Madison Avenue	Washington	Wealthy	4	1973	
Madison Avenue	Wealthy	Fifth	6	2628	4601
Mechanic	North Union	Grand	4	555	555
North East	East Fulton, north		4	474	474
North Lafayette	Trowbridge	East Bridge	6	1257	
North Lafayette	East Bridge	Lyon	16	1054	
North Lafayette	Lyon	East Fulton	6	1520	3831
North College	Hastings	Lyon	6	1713	ļ .
North College	Lyon	East Fulton	16	1600	3313
North Union	East Bridge	D., G. H. & M. R. R.	4	862	
North Union	Crescent	East Fulton	4	2170	3032
North Prospect	East Bridge	Lyon	4	1020	
North Prospect	Lyon	East Fulton	6	1599	2619
Newberry	Clinton	Livingston	8	326	326
Oak Avenue	North Union	Grand	4	658	653
Paris	Cherry	Wealthy	6	1323	
Paris	Wealthy	Mills	4	1532	2855
Packard	Lake	Cherry	4	801	801
Ransom	East Bridge	Lyon	4	1105	1105
Sinclair	East Bridge	Hastings	4	719	719
South Prospect	East Fulton	Washington	4	657	657
South Union	East Fulton	Wealthy	4	2642	!
South Union	Wealthy	Thomas	6	1979	4621
South College	East Fulton	Logan	16	8319	8319
Terrace	Wealthy	Logan	4	659	1
Terrace	 Fifth	North of Lawn Court	4	725	1384
Thomas	Madison	Henry	4	1972	1972
Wealthy	Terrace	- 1	10	1017	
Wealthy	South College	South East	12	1977	2994
Washington	South Lafayette		4	1820	1320

LOCATION OF HYDRANTS—EAST SIDE.

STREET.	WHERE LOCATED.	KIND.
Barclay	Intersection of John street	Lowry
Barclay	West side about 300 feet north of Fountain	Post
Bartlett	Northwest corner of Waterloo	Post
Buchanan	Northwest corner of Prescott	Post
Buchanan	Southwest corner of Wealthy	Post
Brainard	West side about £00 feet north of E. Bridge	Post
Brainard	West side near D., G. H. & M. R. R	Post
Bradford	Southwest corner of Coit avenue	Post
Canal	Northwest corner of Pearl street	Post
Canal	Northwest corner of Lyon street	Post
Canal	Northwest corner of Huron street	Post,
Canal	Northwest corner of Erie street	Post
Canal	Southwest corner of East Bridge street	Post
Canal	West side midway to Hastings street	Post
Canal	West side opposite Hastings street	Post
Canal	West side midway to Trowbridge street	Post
Canal	West side opposite Trowbridge street	Post
Canal	Northwest corner of East Leonard street	Post
Сапа1	West side near Howland street	Post
Canal	West side about 500 feet south of Quimby street	Post
Canal	West side opposite Quimby street	Post
Canal	West side about 400 feet north of Quimby street	Post
Canal	West side near city limits	Post
Calder	Northwest corner Oakes street	Post
Calder	Northwest corner Island street	Post
Colfax	Northwest corner of Queen street	Post
Carrier	Northeast corner of Plainfield avenue	Post
Carrier	North side opposite Coit avenue	Post
Carrier	Northwest corner of Reed street	Post
Carrier	Northwest corner of North avenue	Post
Carrier	Northwest corner of North College avenue	Post
Crescent	Northwest corner of Ransom street	Post
Crescent	Northeast corner of Barclay street	Post
Crescent	Northwest corner of North Lafayette street	Post
Crescent	Northeast corner of North Prospect street	Post
Crescent	North side midway to North College avenue	Post
Crescent	Northwest corner of North College avenue	Post
Crescent	Northwest corner of North Union street	Post

STREET.	WHERE LOCATED.	KIND
		<u></u> -
Crescent,	Northwest corner of Benson street	Post
Campau	Southwest corner of Lyon street	Post
Campau	Northeast corner of Pearl street	Post
Campau	East side about 100 feet north of Pearl street	Galvin sprinkling.
Campau	Southwest corner of Louis street	Post
Coldbrook	Northeast corner of Canal street	Post
Coldbrook	Northwest corner of North Ionia street	Post
Coldbrook	Northwest corner of Taylor street	Post
Coldbrook	Southwest corner of Livingston street	Post
Coldbrook	South side near D., G. H. & M. R. R. tracks	Post
Clinton	Northwest corner of Hastings street	Post
Clinton	Northwest corner of Trowbridge street	Post
Clinton	Northwest corner of Fairbanks street	Post
Clinton	Southwest corner of Newberry street	Post
Clancy	Northeast corner of Cedar street	Post
Clancy	Southwest corner of Matilda street	Post
Clancy	Northwest corner of Bradford street	Post
Clancy	Northwest corner of Fairbanks street	Post
Clancy,	Northwest corner of Trowbridge street	Post
Clancy,	Southwest corner of Hastings street	Post
Coit avenue	Northwest corner of Hastings street	Post
Coit avenue	Northwest corner of Trowbridge street	Post. ·
Coit avenue	Northwest corner of Fairbanks street	Post
Cherry	Northwest corner of East street	Post
Cherry	Southwest corner of Charles street	Post
Cherry	Southwest corner of Henry street	Post
Cherry	Southwest corner of James street	Post
Cherry	Southwest corner of South Union street	Post
Cherry	North side opposite Paris avenue	Post
Cherry	Southeast corner of South College avenue	Post
Cherry	Intersection of Madison avenue	Lowry
Cherry	Intersection of South Prospect street	Lowry
Cherry	Northeast corner of South Prospect street	R.D.Wood&Co's sprinkling.
Cherry	Intersection of South Lafayette street	Lowry
Cherry	Intersection of Waverly Place	Lowry
Cherry	Intersection of Jefferson avenue	Lowry
Cherry	Intersection of South Spring street	Lowry
Cherry	Intersection of South Ionia street	Lowry

STREET.	WHERE LOCATED.	KIND.
	Intersection of Almy street.	Lowry
Cherry	Intersection of Calder street	Lowry
Caledonia	North side about 550 feet west of Plainfield avenue	Post
Cass	Northwest corner of Wenham avenue	Post
Cass	Northwest corner of Blakely avenue	Post
Cass	Northwest corner of Pleasant street	Post
Cass	Northwest corner of Sycamore street	Post *
Cass	Northwest corner of Fifth avenue	Post
Cass	Northwest corner of Powell street	Post
Center	Northwest corner of Pleasant street	Post
Center	Northwest corner of Sycamore street	Post
Center	Northwest corner of Fifth street	Post
Center	Northwest corner of McDowell street	Post,
Center	Northwest corner of Monson street	l'ost
Center	Northwest corner of Green street	Post
Center	Northwest corner of Hall street	Post
Charles	West side about 660 feet south of Cherry street	Post
Chestnut	Northwest corner of Oakland avenue	Post
Chestnut	Northeast corner of Godfrey street	Post
Ellsworth avenue	Northwest corner of Island street	Post.,
Ellsworth avenue	Northwest corner of Oakes street	Post
Ellsworth avenue	Southwest corner of Cherry street	Post
Ellsworth avenue	Southwest corner of Williams street	Post
Ellswerth avenue	Intersection of Bartlett street	Lowry
Ellsworth avenue	Intersection of Goodrich street	Lowry
Ellsworth avenue	Intersection of Wealthy avenue	Lowry
East Bridge	Southwest corner of Kent street	Post
East Bridge	Southeast corner of Ottawa street	Post
East Bridge	Southeast corner of North Ionia street	Post
East Bridge	Southeast corner of North Division street	Post
East Bridge	South side opposite Clinton street	Post
East Bridge	South side opposite Livingston street	Post
East Bridge	South side opposite Coit avenue	Post
East Bridge	Southwest corner of Barclay street	Post
East Bridge	Northeast corner of Clancy street	Post
East Bridge	Northeast corner of North Lafayette	Post
East Bridge	Northwest corner of Prospect Place,	Post
East Bridge	Northwest corner of North avenue	Post

STREET.	WHERE LOCATED.	KIND.
	Northwest corner of Sinclair street	Post
East Bridge	Northwest corner of North College avenue	Post
East Bridge	Northwest corner of Brainard street	Post
East Bridge	Northwest corner of North Union street	Post
East Fulton	Northwest corner of Campau street	Post
East Fulton	Northwest corner of North Waterloo	Post
East Fulton	Northwest corner of Ottawa street	Post
East Fulton	Southeast corner of Almy street	Post
East Fulton	Northeast corner of North Ionia street	Post
East Fulton	Northeast corner of North Spring street	j R.D.Wood&Co's sprinkling.
East Fulton	Intersection of South Spring street	Lowry
East Fulton	Northwest corner of North Division street	Post
East Fulton	Northeast corner of West Park Flace	Post
East Fulton	Northwest corner of East Park Place	Post
East Fulton	Northwest corner of Ransom street	Post
East Fulton	North side opposite Jefferson avenue	Post
East Fulton	Northeast corner of Barclay street	Post
East Fulton	Northeast corner of North Lafayette street	Post
Ea-t Fulton	Northeast corner of North Prospect street	Post
East Fulton,	Southwest corner of South College avenue	Post
East Fulton	Northwest corner of North Union street	Post
East Fulton	Northwest corner of Grand avenue	Post
East Fulton	Nosthwest corner of North East street	Post
East Leonard	North side opposite North Ionia street	Post
East Leonard	Northwest corner of Taylor street	Post
East Leonard	Northeast coaner of Plainfield avenue	Post
East Leonard	Northwest corner of Coit avenue	Post
East Leonard	Northwest corner of Holcomb street	Post
Fountain	Intersection of Bostwick street	Lowry
Fountain	Intersection of Ransom street	Lowry
Fountain	Northeast corner of Barclay street	Post
Fountain	Northeast corner of North Lafayette street	Post
Fountain	Northwest corner of North Prospect street	Post
Fountain	North side midway to North College avenue	Post
Fountain	Northwest corner of North College avenue	Post
Fountain	Northwest corner of North Union street	Post
Fountain	Northwest corner of Grand avenue	Post
Fifth avenue	Northwest corner of Buchanan street	Post

STREET.	WHERE LOCATED.	KIND.
Fifth avenue	Northwest corner of South Ionia street.	Post
Fifth avenue.	Northwest corner of South Division street.	
Fifth avenue	Northwest corner of Jefferson avenue	
Fifth avenue	Northwest corner of South Lafayette street	
Fifth avenue		Post
Fifth avenue		
•		
	Northeast corner of Buchanan street	
Finney	Northwest corner of Wealthy avenue	Post
Finney		Post
Finney		
Finney	Northwest corner of Williams street	Post
	Northwest corner of Grandville avenue	Post
Goodrich	Northwest corner of Ney street	Post
Goodrich	Northwest corner of South Waterloo street	Post
Grandville	Northwest corner of King street	Post
Grandville	Northwest corner of Prescott street	Post
Grandville	Northwest corner of Second avenue	Post
Grandville	Northwest corner of Third avenue	Post
Grandville	Northwest corner of Fourth avenue	Post
Grandville	Southwest corner of Chestnut street	Post
Grandville	Southwest corner of Laurel street	Post
Grandville	Northwest corner of Fifth avenue	Post
Grove	Northwest corner of Plainfield avenue	Post
Grove	North side about 400 feet west of Plainfield avenue	Post
Henry	Northwest corner of Buckeye street	Post
Henry	Northwest corner of Logan street	Post
Henry	Northwest corner of Sherman street	Post
Henry	Northwest corner of Thomas street	Post
Hilton	Northwest corner of First avenue	Post
Hilton,	Northwest corner of Second avenue	Post
Hilton	Northwest corner of Third avenue	Post
Hilton	Northwest corner of Fourth avenue	Post
Hilton	Northwest corner of Rumsey street	Post
Hilton		
Holbrook		Post
Innes:	Northwest corner of Grand avenue.	
	Intersection of Island street	
- 1	Intersection of Washington street.	•
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EAST SIDE WATER MAINS-LOW SERVICE-CONTINUED.

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STREET	FROM	то	DIAM, IN	LENGTH CAST IRON	LENGTH	TOTAL
Fifth Avenue	South Division	Cass	10	1244		
Fifth Avenue	Cass	Terrace	8	657	ļ	3223
Finney	Wealthy	Williams	6	1015	j	1015
Goodrich	Grandville	South Waterloo	4	1197		1197
Grandville	Goodrich	Fifth Avenue	12	3189		3189
Grove	Plainfield	Taylor	4	809	 	809
Hilton	Prescott	Fifth	6	2112		3112
Hastings	Kent	West to Alley	6		135	135
Huron	Canal	Mill	4	294	 	294
Jefferson Avenue	East Fulton	Wealthy	6	46	2594	
Jeffer: on Avenue	Wealthy	Hall	6	5285		7925
Kent	Lyon	East Bridge	6	1040		
Kent	East Bridge	Trowbridge	6		1169	
Kent	Trowbridge	Mason	6	1701	l	3910
Kent Alley	Lyon	East Bridge	4	1130		1130
Lagrave	East Fulton	Wealthy	6	2640	, •••••	
Lagrave	Wealthy	Blakeley	4	1037	ļ	3677
Livingston	Reservoir	Newberry	20	349		349
Louis	North Waterloo	Campau	8	430	1	430
Lyon	Grand River	Canal	6	469		
Lyon	Canal	North Division	10	1116	·····	
Lyon	North Division	Ransom	6	881		2466
Madison	Plainfield	North	6	1483		1433
Morrison	South Lafayette	Jefferson	4	633		633
Mason	Reservoir	Grand River	16	1750		1750
Monroe	Pearl	Ottawa	10	692		•••••
Monroe	Ottawa	North Division	12	801		
Monroe	North Division, east		8	98		1591
Mill	Huron, north		4	332		332
McDowell	Jefferson	South Division	4	940	,	940
North Ionia	Coldbrook	Mason	8	1420		
North Ionia	Mason	East Bridge	20	2820		
North Ionia	Pearl	Monroe	10	694		
North Ionia	Monroe	East Fulton	6		585	5519
North Division	East Bridge	Monroe	16	2448	·	
North Division	Monroe	East Fulton	12	163		2611
North Coit	Quimby	Sweet	6	867		867
North Avenue	East Bridge	Trowbridge	6.	1268	 	1268

EAST SIDE WATER MAINS—LOW SERVICE -CONTINUED.

STREET	FROM	то	DIAM. IN INCHES	LENGTH CAST IRON	LENGTH	TOTAL
Ninth Avenue	South Division	M. C. R R. Grounds	6	1945		1945
Newberry	North Ionia	Livingston	20	881		881
North Waterloo	Monroe	East Fulton	8	1049	.	1049
Ottawa	Canal	Mason	24	1590		
Ottawa	Mason	East Fulton	12	4836		6426
Pearl	North Division	Campau	10	1386		
Pearl	Campau	Grand River	6	260		1646
Prescott	South Division	Buchanan	8	1825		1325
Perry	Quimby	Page	4	657		657
Page	Plainfield	North	6	1795		1795
Powell	Jefferson	South Lafayette	4	657		657
Plainfield	Coldbrook	East Leonard	6	942	ļ	
Plainfield	East Leonard	Sweet	8	2911		3858
Quimby	Canal	Reed	6	2296		2296
Ransom	Lyon	East Fulton	4	1534	j	1534
Reed	Quimby	Madison	4	441		
Reed	Carrier	Page	1	365		806
Second Avenue	South Division	Buchanan	4	1383		
Second Avenue	Grandville, west		4	525		1908
Sixth Avenue	South Division	South Ionia	4	660		660
Seventh Avenue	South Division	South Ionia	4	660		660
Sheldon	East Fulton	Oakes	6	860		· · · · · · ·
Sheldon	Oakes	Blakeley	4	2805		3665
Sycamore	South Division	 Jefferson	4	957	ļ	957
South Division	East Fulton	Fifth	12	5274		۱
South Division	Fifth	Hall	8	2636	ļ	7910
South Ionia	East Fulton	Oakes	8		828	ļ.
South Ionia	Oakes	Hall	6	7077		7905
South Lafayette	East Fulton	Cherry			1318	
South Lafayette.	Cherry	Logan	6	1963	 	
South Lafayette	Logan	Sycamore	4	1436		
South Lafayette	Sycamore	Highland	6	2386		7103
Taylor	East Leonard	Quimby	6	1722		1722
Trowbridge	Canal	Kent	8	305	·	305
Third Avenue	South Division	Buchanan	4	1274	١	1274
Twelfth Avenue	South Division	South Ionia	4	660		660
Wealthy	Buchanan	South Waterloo	8	1868	ļ ,	
Wealthy	South Division	Terrace	10	2003	·····	3871

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WEST SIDE WATER MAINS—LOW SERVICE.

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STREET.	FROM	то	DIAM'TR INCHES.	CAST IRON PIPE.	WYCKOFF PIPE.	TOTAL LENGTH.
Allen	Summer	Winter	8		295	295
Broadway	W. Bridge	W. Leonard	12	5257		
Broadway	W. Leonard	Webster	10	1834	 .	7091
Butterworth	S. Front	River avenue	8	2269		2269
Court	W. Fulton	Shawmut	6	984		984
Eighth	Broadway	Grand River	16	973		973
Fourth	Broadway	Seward	8	846		
Fourth	Seward	N. Lane avenue	6	2660	 	3506
Fifth	Broadway	Muskegon	8	1157		
Fifth	Muskegon	McReynolds	4	767		1934
First	Michigan	N. Pine	4	1506		1506
Gold	W. Bridge	W. Fulton	4	2645		
Gold	W. Fulton	Watson	8	684		
Gold	Watson	Butterworth	4	669	,	3948
Jackson	Straight	S. Pine	6	1665		1665
Michigan	W. Bridge	Second	6	835		١
Michigan	Second	Fourth	4	742		1577
Mt. Vernon and alley	Shawmut	Valley	4	1118		1113
North Front	W. Bridge	Fifth	6	1925		
North Front	Eighth	Eleventh	6	1158		
North Front	Eleventh	W. Leonard	4	1291		4374
North Jefferson	W. Bridge	Third	4	1178		1178
North Pine	W. Bridge	Second	6	819		819
Peaslee	Straight	Gunnison	4	1010		1010
Summer	W. Bridge	W. Fulton	4	886	2398	2634
Second	Broadway	Stocking	4	1573	j	1573
Seventh	Broadway	Stocking	10	2830		2830
Seward	Fourth	Fifth	6	404		404
Scribner	W. Bridge	Eighth	6		2889	
Scribner	Eighth	Webster	8		1288	7077
Shawmut	S. Front	Winter	6	1095		
Shawmut	Winter	S. Jefferson	6		709	
Shawmut	S. Jefferson	Straight	6	986		2782
Stocking	W. Bridge	Fourth	8	1878		
Stocking	Fourth	Seventh	6	1273		8151
Straight	W. Bridge	Jackson	6	989		
Straight	Shawmut	Watson	6	1671		
Straight	Watson	Butterworth	8 ;	832		3492
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WEST SIDE WATER MAINS—LOW SERVICE—CONTINUED.

STREET.	FROM	то	DIAM'TR	CAST IRON PIPE.	WYCKOFF РІРЕ.	TOTAL LENGTH.
South Front	W. Bridge	Shawmut	6		1670	
South Front	W. Fulton	Butterworth	12	1389		ļ
South Front	Butterworth	Baldwin	8	1026		4085
South Jefferson	W. Bridge	Butterworth	4	8810		3810
South Pine	W. Bridge	Jackson	6	1004		1004
Third	Broadway	Seward	4		824	
Third	Seward	Stocking	6	1023		1847
Turner	W. Bridge	Second	6	774		
Turner	Second	Fifth	4	1147		
Turner	Fifth	Eleventh	6	2014		
Turner	Eleventh	Webster	4	3142		7077
West Bridge	N. and S. Front, east		4	189		
West Bridge	N. and S. Front	Fremont	12	8981		
West Bridge	Fremont	Lincoln	8	1406		5226
West Fulton	Grand River	Winter	12	1129		
West Fulton	Winter	Gold	8	938		
West Fulton	Gold	Indiana	12	1215		
West Fulton	Indiana	Gunnison	10	647	••••	3929
West Leonard	N. Front	Scribner	8	270		İ
West Leonard	Scribner	Alpine	12	3158	••••	8428
West Broadway	W. Bridge	i Butterworth	4	4026		4026
Watson	Gold	Straight	8	656		
Watson	Straight	Shepard	6	1277		1933
Winter	W. Bridge	W. Fulton	12	2630	· • · · ·	2680

STREET.	WHERE LOCATED.	KIND.
Wealthy	Northwest corner of Cass street	Post
Wealthy	Southwest corner of Lagrave street	Post
Wealthy	Southwest corner of Sheldon street	Post
Wealthy	Northwest corner of Ney street	Post
Wealthy	Northeast corner of South Waterloo	Post

LOCATION OF HYDRANTS—WEST SIDE.

STREET	WHERE LOCATAD	KIND
Broadway	Northwest corner of First street	Post
Broadway	Northwest corner of Second street	Post
Broadway	Northwest corner of Third street	Post
Broadway	Northwest corner of Fourth street	Post
Broadway	Northwest corner of Fifth street	Post
Broadway	Northwest corner of Sixth street	Post
Broadway	Northwest corner of Seventh street	Post
Broadway	Northwest corner of Eighth street	Post
Broadway	Northwest corner of Ninth street	Post
Broadway	Northwest corner of Tenth street	Post
Broadway	Southwest corner of Eleventh street	Post
Broadway	West side, about 400 feet north of Eleventh street	Post
Broadway	West side, about 400 feet south of West Leonard street	Post
Broadway	Northwest corner of West Leonard street	Post
Broadway	Northwest corner of Crosby street	Post
Broadway	Southwest corner of Myrtle street	Post
Broadway	Northwest corner of Webster street	Post
Butterworth	Northwest corner of Mt. Vernon street	Post
Butterworth	Northwest corner of South Jefferson street	Post
Butterworth	Northwest corner of Gold street	Post
Butterworth	Northwest corner of West Broadway	Post
Butterworth	Northwest corner of Straight street	Post
Butterworth	Northwest corner of Indiana street	Post
Butterworth	North side, opposite River avenue	Post
Court	West side, near G. R. & I. R. R. track	Post
Eighth	Northwest corner of North Front street	Post
Eighth	Northwest corner of Scribner street	Post
Eighth	Northwest corner of Turner street	Post
Fourth	North side, about 260 feet west of Broadway	Post
Fourth	Northwest corner of "D" street	Post
Fourth	Northwest corner of Seward street	Post
Fourth	Northeast corner of Davis street	Post
Fourth	Southwest corner of Beech avenue	Post
Fourth	North side, near northwest corner of Stocking street	
Fourth	North side, near northwest corner of Pettibone street	Post
Fourth	Northwest corner of Fremont street	Post
Fourth	Northwest corner of North Lane avenue	Post
Fifth	North side, about 430 feet west of Broadway	Post.
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STREET	WHERE LOCATED	KIND.
Fifth	Northwest corner of Seward street.	Post
Fifth	Northwest corner of Muskegon street	Post
Fifth		Post
	,	Post
Fifth	Northwest corner of McReynolds street	
First	Northwest corner of Pettibone street	
First	Northwest corner of Fremont street	Post
First	Northwest corner of North Lane avenue	Post
First	Northwest corner of North Pine street	Post
Gold	Northwest corner of Bowery street	Post
Gold	Northwest corner of Chatham street	Post
Gold	Northwest corner of Jackson street	Post
Gold	Northwest corner of Sibley street	Post
Gold	Northwest corner of California street,	Post
Gold	Northwest corner of Veto street	Post
Gold	Northwest corner of Watson street	Post
Jackson	Northwest corner of Indiana street	Post
Jackson	North side about 450 feet west of Indiana street	Post
Jackson	Northwest corner of South Lane street	Post
Jackson	Northwest corner of South Pine street.	Post
Michigan	Southwest corner of First street	Post
Michigan	Northwest corner of Second street	Post
Michigan	Northwest corner of Third street	Post
Mount Vernon	Northwest corner of Valley street	Post
Mount Vernon	Northwest corner of Allen street	Post
North F ont	Northwest corner of First street	Post
North Front	Northwest corner of Second street	Post
North Front	Northwest corner of Third street	Post
North Front	Northwest corner of Fourth street.	Post
North Front	Northwest corner of Fifth street	Post
North Front	Southwest corner of Ninth street	Post.
North Front	Northwest corner of Tenth street	Post
North Front	Northwest corner of Eleventh street	
North Front	West side about 600 feet north of Eleventh street	Post
North Front	Northwest corner of Webster street.	Post
North Jefferson	Northwest corner of First street.	Post.
North Jefferson	Northwest corner of Second street	Post
North Pine	Northwest corner of Second street	Post
Peaslee.	Northwest corner of Indiana street.	
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STREET.	WHERE LOCATED.	KIND,
Peaslee	Northwest corner of Dayton street	Post
Peaslee	Northwest corner of Gunnison street	Post
Summer	Intersection with Bowery street	Lowry
Summer	Intersection with Allen street	Lowry
Summer	Northwest corner of Shawmut avenue	Post
Summer	Near G. R. & I. R. R. tracks.	Post
Summer	East side about 250 feet north of West Fulton street	Post
Second	Northwest corner of Alabama street	Post
Second	Northwest corner of Seward street	Post
Second	Northeast corner of Stocking street	Post
Seventh	North side about 600 feet west of Broadway street	Post
Seventh	Northwest corner of Muskegon street	Post
Seventh	Northwest corner of Davis street	Post
Seventh	Northwest corner of McReynolds	Post
Seventh	Northwest corner of Alpine avenue	Post
Seventh	Northwest corner of Jenuette street	Post
Scribner	Intersection of First street	Lowry
Scribner	Intersection of Second street	Lowry
Scribner	Intersection of Third street	Lowry
Scribner	Intersection of Fourth street	Lowry
Scribner	Intersection of Fifth street	Lowry
Scribner	Intersection of Sixth street	Lowry
Scribner	Intersection of Tenth street	Lowry
Scribner	Intersection of Eleventh street	Lowry
Scribner	About 650 feet north of Eleventh street	Lowry
Scribner	Intersection of Crosby street	Lowry
Scribner	Intersection of Myrtle street	Lowry
Scribner	Intersection of Webster street	Lowry
Stocking	Intersection of First street	Lowry
Stocking	West side opposite Fifth street	Post
Stocking	West side opposite Sixth street	Post
Stocking	Southwest corner of Seventh street	Post
Straight	Northwest corner of Bowery street	Post
Straight	i	Post
Straight	Northwest corner of Jackson street	Post
Straight	Northwest corner of Shawmut avenue	Post
Straight	Northwest corner of California street	Post
Straight	Northwest corner of Veto street	Post

STREET.	WHERE LOCATED.	KIND.
Straight	Northwest corner of West Fulton street	Post
Straight	Northwest corner of Hovey street	Post
Straight	Northwest corner of Watson street	Post
Shawmut	Northwest corner of Court street	Post
Shawmut	Northwest corner of Mt. Vernon street	Post
Shawmut	Northwest corner of Winter street	Post
Shawmut	Intersection of West Division	Lowry
Shawmut	Northwest corner of South Jefferson street	Post
Shawmut	Northwest corner of Gold street	Post
Shawmut	Northwest corner of West Broadway street	Post
South Front	Intersection of Bowery street	Lowry
South Front	Intersection of \alley street	Lowry
South Front	Intersection of Allen street	Lowry
South Front	Intersection of Shawmut avenue	Lowry
South Front	West side about 430 feet north of Watson street	Post
South Front	Northwest corner of Watson street	Pcst
South Front	Northwest corner of Earle street	Post
South Front	Northwest corner of Baldwin street	Post
South Jefferson	Northwest corner of Bowery stre: t	Post
South Jefferson	Northwest corner of Chatham street	Post
South Jefferson	Northwest corner of Jackson street	Post
South Jefferson	Northwest corner of Sibley street	Post
South Jefferson	Northwest corner of California street	Post
South Jefferson	Northwest corner of Veto street	Post
South Jefferson	Northwest corner of Watson street	Post
South Pine	West side opposite Bowery street	Post
South Pine	Northwest corner of Chatham street	Post
Third	Intersection of Alabama street	Lowry
Third	Northwest corner of Seward street	Post
Third	Northwest corner of Maple avenue	Post
Third	Northeast corner of Stocking street	Post
Turner	Northwest corner of First street	Post
Turner	Northwest corner of Second street	Post
Turner	Northwest corner of Third street	Post
Turner	Northwest corner of Fourth street	Post
Turner	Northwest corner of Fifth street	Post
Turner	Northwest corner of Sixth street	Post
Turner	Southwest corner of Seventh street	Post

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West Fulton	West Fulton	Northwest corner of Indiana street	Post
	West Fulton	Northwest corner of Deloney street	Post
	West Fulton	Northwest corner of Gunnison street	Post
	West Leonard	Northwest corner of North Front street	Post

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West Leonard	Northwest	corner of	Quarry street.		Post
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West Leonard	Northwest	corner of	Muskegon stre	et	Post
West Leonard	Northwest	corner of	Davis street		Post
West Leonard	Northwest	corner of	McReynolds st	reet	Post
West Leonard	Northwest	corner of .	Alpine avenue		Post
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West Broadway	Northwest	corner of	Chatham street		Post
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East Side	41 21	379 192	3	423 213	3 12
	62	571	3	636	15

LIST OF GATE VALVES—EAST SIDE.

STREET.	LOCATION.	Size.
Barclay	South line East Bridge street	14
Barclay	South line Crescent avenue	4
Barclay	North line Lyon street.	4
Barclay	South line Lyon street	4
Barclay	North line East Fulton street	4
Bostwick	South line Lyon street	4
Bartlett	West line Ellsworth avenue	4
Bartlett	East line South Waterloo street	4
Buchanan	South line Wealthy avenue	8
Bradford	West line Clancy street	16
Brainard	North line East Bridge street	4
Canal	South line Lyon street	10
Canal	South line East Bridge street	10
Canal	North line East Bridge street	8
Canal	At Pump Station	12
Canal	At Pump Station on Force Main	24
Canal	At Pump Station blow off to river	4
Canal	North line East Leonard street.	8
Canal	South line Quimby street	8
Canal	South line Sweet street	8
Calder	South line East Fulton street	
Calder	North line Cherry street	
Carrier	East line Plainfield avenue	
Carrier	East line Reed street	
Carrier	West line North College avenue	
Clinton	North line East Bridge street	
Clinton	South line Newberry street.	
Colfax	(West line North Coit avenue	
Coldbrook	East line Taylor street.	
Coldbrook	East line North Jonia street	16
Clancy	North line Bradford street	10
Clancy	South line East Bridge street.	10
Cedar	East line Clancy street.	12
Cedar	West line Clancy street (blow off)	1
Campau	South Line Lyon street.	
Campau	North line Pearl street.	,
Campau		
Campau	South line Pearl street	١ ،

STREET	LOCATION.	Size.
Coit avenue	North line East Bridge street	14
Coit avenue	North line Hastings street	6
Coit avenue	South line Bradford street	6
Crescent avenue	West line Ransom street	4
Crescent avenue	East line North Lafayette street	6
Crescent avenue	West line North College avenue	6
Crescent avenue	West line North Union street	6
Cherry	East line Ellsworth avenue	8
Cherry	West line South Division street	8
Cherry	West line South Lafayette street	8
Cherry	East line South Lafayette street	8
Cherry	East line North College avenue	8
Cherry	West line North College avenue	8
Cherry	West line Henry street	8
Cherry	West line East street	8
Caledonia	West line Plainfield avenue	4
Caledonia	East line Taylor street	4
Cass	North line Wealthy avenue	4
Cass	South line Wealthy avenue	6
Cass	South line Blakeley avenue	6
Cass	North line Fifth avenue	6
Center	South line Blakeley avenue	6
Center	South line Fifth avenue	6
Center	North line Fifth avenue	6
Center	South line McDowell street	6
Center	North line Hall street	6
Charles	South line Cherry street	4
Charles	 North line Wealthy avenue	4
Chestnut	West line Grandville avenue	4
Chestnut	East line Godfrey avenue	4
Elisworth	South line East Fulton street	12
Ellsworth	South line Cherry street	; 8
Ellsworth	North line Wealthy avenue	8
Eighth avenne	West line South Division street	4
Eleventh avenue	West line South Division street	4
East Fulton	East end of bridge	13
East Fulton	West line Waterloo street	12
East Fulton	East line Waterloo street	12

	st line South Division street.	
		10
East Fulton We	est line South Division street	12
East Fulton Ea	st line Lagrave street	10
East Fulton Ne	ear center Lafayette street	10
East Fulton Ea	st line College avenue	10
East Leonard Ea	st line Canal street	12
East Leonard Ea	st line Plainfield avenue	6
East Bridge Ea	st line Ottawa street	16
East Bridge Ea	st line Clinton street	12
East Bridge We	est line Coit avenue	12
East Bridge Ea	st line Barclay street	10
East Bridge Ea	st line North Lafayette street	10
East Bridge We	est line North College avenue	10
East Bridge Ea	st line North Collège avenue	8
Fountain Ea	st line North Division street	4
Fountain No	ear center Barclay street	4
Fountain Ea	st line Barclay street	4
Fountain W	est line North Lafayette street	4
Fountain Ea	ast line North Lafayette street	6
Fountain Ea	ast line North College avenue	6
Fountain W	est line North College avenue	6
First avenue W	est line South Division street	4
Fourth avenue W	est line South Division street	4
Fifth avenue We	est line South Division street	12
Fifth avenue Ea	st line South Division street	10
Fifth avenue Ea	sst line Jefferson avenue	10
Fifth avenue W	est line Terrace avenue	8
Finney No	orth line Wealthy avenue	6
Goodrich W	est line Grandville avenue	4
Goodrich F.a	ast line South Waterloo street	4
Grandville So	outh line Wealthy avenue	12
Grandville So	outh line Second avenue	12
Grandville No	orth line Fifth avenue	12
Grove W	est line Plainfield avenue	4
Grove Ea	ast line Taylor street	4
Henry So	outh line Cherry street	4
	orth line Wealthy avenue	4
	outh line Wealthy avenue	6

STREET.	LOCATION.	Sizi
Henry	South line Sherman street	
Hilton	South line Prescott street	ĺ
Hilton	North line Fifth avenue	ĺ
Hastings	East line Livingston street	
Huron	West line Canal street	ŀ
nnes	East line North Union street	}
efferson avenue	South line East Fulton street	ĺ
efferson avenue	North line Wealthy avenue	
efferson avenue	South line Wealthy avenue	
efferson avenue	South line Blakely avenue	
efferson avenue	South line Fifth avenue	ĺ
efferson avenue	North line Fifth avenue	}
efferson avenue	South line McDowell street	
efferson avenue	North line Hall street	
ames	South line Cherry street	ĺ
ames	South line Wealthy avenue.	[
ames	North line Wealthy avenue	
ulia	East line North Union street	ĺ
Kellogg	East line South Union street	ļ
Cent street	North line Lyon street	1
Cent street	North line East Bridge street	
Cent street	South line East Bridge street.	
Cent street	South line Mason street	1
Cent alley	South line East Bridge street.	
Cent alley	North line Lyon street	
Agrave		
agrave	South line East Fulton street	l
agrave	South line Cherry street.	
agrave	North line Wealthy avenue	ĺ
ivingston	South line Wealthy avenue	ĺ
Livingston	North line East Bridge street	ĺ
	North line Trowbridge street	
ivingston	About 150 feet north of Newberry street	ĺ
ivingston	Between high and low service	
ivingston	At Reservoir	
	West line north Waterloo street	1
ouis	Campau alley	
yon	At river [blow off	

	STREET.	LOCATION.	Size
ī	yon	East line Canal street	1
I	yon	West line Ottawa street	1
I	yon	West line North Division street	1
I	yon	East line North Division street,	
I	yon	West line North Lafayette street	
I	∠yon	West line North College avenue	1
I	yon	East line North College avenue	
	ake avenue	East line South Union	
	ake avenue	West line South East	
	Madison street	East line Plainfield avenue	
	Mudison street	West line North avenue	
	dorrison	West line South Lafayette street	
	Morrison	East line Jefferson street	
	Madison avenue	South line Washington street	
	dadison avenue	North line State street.	
	Madison avenue	South line Cherry street	
	Madison avenue	North line Wealthy avenue	
	Madison avenue	South line Wealthy avenue	
	Madison avenue	North line Mills street.	
	Madison avenue	North line Fifth avenue	
	Mechanic	Fast line North Union street.	
	Mason	At Reservoir	
	Mason	East line North Ionia street.	
	Mason	East line North Ionia street (blow off)	
	Mason	East line Ottawa street.	
	Mason	West line Ottawa street	
	Mason	West line Canal street	
	Monroe	West line Ottawa street	
	Monroe	West line North Division street	l
	McDowell	West line Jefferson avenue	
	MicDowell	East line South Division street	
	North Ionia	South line Coldbrook street	
	North Ionia	North line Mason street	
	North Ionia	South liue Mason street.	
	North Ionia	North line East Bridge street	
	North Ionia	South line Pearl street	
	North Ionia	North line Monroe street	
	North Ionia	South line Monroe street	ı

STREET.	LOCATION.	Size.
North Ionia	North line East Fulton street	6
North Lafayette	North line East Bridge street	6
North Lafayette	South line East Bridge street	16
North Lafayette	North line Lyon street	16
North Lafayette	South line Lyon street.	6
North Lafayette	North line East Fulton street	6
North College	North line East Bridge street	6
North College	South line East Bridge street	6
North College	North line Lyon street	6
North College	South line Lyon street	16
North College	North line East Fulton street	16
North Union	North line East Bridge street	
North Union	South line Crescent avenue	4
North Union	North line Fountain street	4
North Union	North line East Fulton street	4
North Prospect	South line East Bridge street	4
North Prospect	North line Lyon street	4
North Prospect	South line Lyon street.	6
North Prospect	North line East Fulton street.	6
North Coit avenue	North line Quimby street	6
North avenue	North line East Bridge street	6
North Division	South line East Bridge street	16
North Division	North line Pearl street	16
North Division	North line Monroe street	16
North Division	North line East Fulton street	12
Ninth avenue		6
Newberry	East line North Ionia street	20
Newberry	East line Clinton street.	8
Newberry	West line Livingston street	8
North Waterloo	South line Monroe street	8
North Waterloo	South line Louis street	8
North Waterloo	North line East Fulton street	8
North East	North line East Fulton street	4
Ottawa	South line Mason street	12
Ottawa	In Mason street blow off to sewer	6
Ottawa	South line Newberry street	13
Ottawa	South line East Bridge street.	12
Ottawa	North line East Bridge street	12

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LIST OF GATE VALVES—EAST SIDE—CONTINUED.

Ottawa South line Lyon street 12 Ottawa South line Monroe street 12 Ottawa North line Monroe street 12 Ottawa North line East Fulton street 12 Oak avenue East line North Union street 4 Paris avenue South line Cherry street 6 Paris avenue North line Wealthy avenue 6 Paris avenue South line Wealthy avenue 4 Pearl West line Ottawa street 10 Pearl West line Ottawa street 10 Pearl East line Canal street 10 Pearl West line Canal street 10 Pearl West line Canal street 10 Pearl West line South Division street 8 Prescott West line South Division street 8 Prescott West line Painfield avenue 6 Perry North line Page street 4 Page East line Plainfield avenue 6 Page West line North avenue 6 Page <th>STREET.</th> <th>LOCATION.</th> <th>Size.</th>	STREET.	LOCATION.	Size.
Ottawa North line Monroe street. 12 Ottawa North line East Fulton street. 12 Oak avenue East line North Union street. 4 Peris avenue. South line Cherry street. 6 Paris avenue. North line Wealthy avenue. 4 Pearls avenue. South line Wealthy avenue. 4 Pearl. West line Ottawa street 10 Pearl. West line Ottawa street 10 Pearl. East line Ottawa street 10 Pearl. West line Canal street 10 Pearl. West line Canal street 10 Pearl. West line Canal street 10 Pearl. West line Canal street 10 Pearl. West line Canal street 10 Pearl. West line South Division street 8 Prescott West line South Division street 8 Prescott West line South Street 6 Perry. North line Page street 6 Page West line North avenue 6 <	Ottawa	South line Lyon street	12
Ottawa North line East Fulton street. 12 Oak avenue East line North Union street. 4 Pøris avenue. South line Cherry street. 6 Paris avenue. North line Wealthy avenue. 6 Paris avenue. South line Wealthy avenue. 4 Pearl. West line North Division street. 10 Pearl. West line Ottawa street. 10 Pearl. East line Ottawa street. 10 Pearl. East line Canal street. 10 Pearl. West line Canal street. 10 Pearl. West line Canal street. 10 Pearl. West line South Division street. 8 Prescott West line South Division street. 8 Perry. North line Page street. 4 Page. West line Page street. 4 Page. West line Page street. 6	Ottawa	South line Monroe street	12
Oak avenue East line North Union street. 4 Paris avenue. South line Cherry street. 6 Paris avenue. North line Wealthy avenue. 6 Paris avenue. South line Wealthy avenue. 4 Pearl. West line North Division street. 10 Pearl. West line Ottawa street. 10 Pearl. East line Canal street. 10 Pearl. West line Canal street. 10 Pearl. West line Canal street. 10 Pearl. West line Canal street. 10 Pearl. West line South Division street. 8 Prescott West line South Division street. 8 Prescott West of Buchanan street. 6 Perry. North line Page street. 4 Page East line Plainfield avenue. 6 Page West line North avenue. 6 Page. West line North avenue. 6 Powell. East line Jefferson avenue. 4 Packard North line Cherry street. 6	Ottawa	North line Monroe street	12
Peris avenue. South line Cherry street. 6 Paris avenue. North line Wealthy avenue. 6 Paris avenue. South line Wealthy avenue. 4 Pearl. West line North Division street. 10 Pearl. West line Ottawa street. 10 Pearl. East line Canal street. 10 Pearl. West line Canal street. 10 Pearl. West line Canal street. 10 Pearl. West line Canal street. 10 Pearl. West line Canal street. 10 Pearl. West line Canal street. 10 Pearl. West line South Division street. 8 Prescott West line South Division street. 8 Prescott West line South Division street. 6 Perscott West line South Division street. 6 Perscott West line South Division street. 6 Perscott West line South Street. 6 Perscott West line Plainfield avenue. 6 Page East line Plainfield avenue.	Ottawa	North line East Fulton street	12
Paris avenue North line Wealthy avenue 6 Paris avenue South line Wealthy avenue 4 Pearl West line North Division street 10 Pearl West line Ottawa street 10 Pearl East line Canal street 10 Pearl West line Canal street 10 Pearl West line Canal street 10 Pearl West line Canal street 10 Pearl West line Canal street 10 Pearl West line South Division street 8 Prescott West line South Division street 6 Perry North line Page street 4 Page East line Plainfield avenue 6 Page West line Plainfield avenue 6 Page West line North avenue 6 Powell East line Jefferson avenue 4 Packard South line Lake avenue 6 Packard North line Cherry street 6 Plainfield North line Coldbrook street 6 Plainfield	Oak avenue	East line North Union street	4
Paris avenue. South line Wealthy avenue. 4 Pearl. West line North Division street. 10 Pearl. West line Ottawa street. 10 Pearl. East line Ottawa street. 10 Pearl. East line Canal street. 10 Pearl. West line Canal street. 10 Pearl. West line Canal street. 10 Pearl. West line Canal street. 10 Pearl. West line Canal street. 10 Pearl. West line Canal street. 10 Pearl. West line Canal street. 10 Pearl. West line Canal street. 6 Perscott West line South Division street. 6 Perscott West line Plainfield avenue. 6 Page West line Plainfield avenue. 6 Page West line North avenue. 6 Packard. North line Cherry street. 6 Packard. North line Cherry street. 6 Plainfield. North line Cherry street. 6 P	Paris avenue	South line Cherry street	6
Pearl West line North Division street 10 Pearl West line Ottawa street 10 Pearl East line Ottawa street 10 Pearl East line Canal street 10 Pearl West line Canal street 10 Pearl West line Canal street 10 Pearl West line Canal street 6 Prescott West line South Division street 8 Prescott West of Buchanan street 6 Perry North line Page street 4 Page East line Plainfield avenue 6 Page West line Reed street 6 Page West line North avenue 4 Page West line Plainfield avenue 6 Powell East line Jefferson avenue 4 Packard South line Cherry street 6 Plainfield North line Cherry street 6 Plainfield North line Coldbrook street 6 Plainfield North line East Leonard street 8 Plainfield <td< td=""><td>Paris avenue</td><td>North line Wealthy avenue</td><td>6</td></td<>	Paris avenue	North line Wealthy avenue	6
Pearl West line Ottawa street 10 Pearl East line Ottawa street 10 Pearl East line Canal street 10 Pearl West line Canal street 10 Pearl West line Canal street 10 Pearl West line South Division street 8 Prescott West line South Division street 8 Prescott West of Buchanan street 6 Perry North line Page street 4 Page East line Plainfield avenue 6 Page West line Reed street 6 Page West line North avenue 6 Powell East line Jefferson avenue 4 Packard South line Lake avenue 6 Packard North line Cherry street 6 Plainfield North line Coldbrook street 6 Plainfield North line East Leonard street 8 Plainfield North line Madison avenue 8 Plainfield North line Quimby street 8 Quimby <t< td=""><td>Paris avenue</td><td>South line Wealthy avenue</td><td>4</td></t<>	Paris avenue	South line Wealthy avenue	4
Pearl East line Ottawa street 10 Pearl East line Canal street 10 Pearl West line Canal street 10 Pearl West line Canal street 10 Pearl West line South Division street 8 Prescott West line South Division street 8 Prescott West of Buchanan street 6 Perry North line Page street 4 Page East line Plainfield avenue 6 Page West line Reed street 6 Page West line North avenue 4 Powell East line Jefferson avenue 4 Packard South line Lake avenue 6 Packard North line Cherry street 6 Plainfield North line Coldbrook street 6 Plainfield South line D. G. H. & M. R. R. grounds 6 Plainfield North line Coldbrook street 8 Plainfield North line Quimby street 8 Quimby East line Plainfield avenue 6 Quimby </td <td>Pearl</td> <td>West line North Division street</td> <td>10</td>	Pearl	West line North Division street	10
Pearl East line Canal street 10 Pearl West line Canal street 10 Pearl West, near end of Bridge (blow off) 6 Prescott West of Buchanan street 8 Perry North line Page street 4 Page East line Plainfield avenue 6 Page West line Reed street 6 Page West line North avenue 6 Powell East line Jefferson avenue 4 Powell East line Jefferson avenue 6 Packard South line Lake avenue 6 Packard North tine Cherry street 6 Plainfield North line Coldbrook street 6 Plainfield North line East Leonard street 8 Plainfield North line East Leonard street 8 Plainfield North line Madison avenue 8 Plainfield North line Quimby street 8 Quimby East line Plainfield avenue 6 Quimby East line Plainfield avenue 6 Quimb	Pearl	West line Ottawa street	10
Pearl West line Canal street 10 Pearl West, near end of Bridge (blow off) 6 Prescott West of Buchanan street 8 Perscott West of Buchanan street 6 Perry North line Page street 4 Page East line Plainfield avenue 6 Page West line Reed street 6 Page West line North avenue 4 Powell East line Jefferson avenue 4 Powell East line Jefferson avenue 6 Packard South line Lake avenue 6 Packard North line Cherry street 6 Plainfield North line Coldbrook street 6 Plainfield North line East Leonard street 8 Plainfield North line Madison avenue 8 Plainfield North line Quimby street 8 Quimby East line Plainfield avenue 6 Quimby East line Plainfield avenue 6 Ransom South line East Bridge street 4 Ransom<	Pearl	East line Ottawa street	10
Pearl. West, near end of Bridge (blow off). 6 Prescott West line South Division street 8 Prescott West of Buchanan street 6 Perry. North line Page street. 4 Page East line Plainfield avenue. 6 Page West line North avenue. 6 Page West line North avenue. 6 Powell. East line Jefferson avenue. 4 Packard South line Lake avenue. 6 Packard North line Cherry street. 6 Plainfield. North line Coldbrook street 6 Plainfield. South line D. G. H. & M. R. R. grounds. 6 Plainfield. South line Madison avenue. 8 Plainfield. South line Madison avenue. 8 Plainfield North line Quimby street. 8 Quimby. East line Plainfield avenue. 6 Quimby. East line Plainfield avenue. 6 Ransom South line East Bridge street 4 Ransom North line Lyon street 4<	Pearl	East line Canal street	10
Prescott West of Buchanan street 6 Prescott West of Buchanan street 6 Perry North line Page street. 4 Page East line Plainfield avenue 6 Page West line Reed street 6 Page West line North avenue 6 Powell. East line Jefferson avenue 4 Packard South line Lake avenue 6 Packard North line Cherry street 6 Plainfield North line Coldbrook street 6 Plainfield North line Coldbrook street 8 Plainfield North line East Leonard street 8 Plainfield North line East Leonard street 8 Plainfield North line Quimby street 8 Quimby East line Canal street 6 Quimby East line Plainfield avenue 6 Quimby West line Plainfield avenue 6 Ransom South line Lyon street 4 Ransom North line East Bridge street 4 Ransom<	Pearl	West line Canal street	10
Prescott West of Buchanan street 6 Perry North line Page street 4 Page East line Plainfield avenue 6 Page West line Reed street 6 Page West line North avenue 6 Powell East line Jefferson avenue 4 Packard South line Lake avenue 6 Packard North line Cherry street 6 Plainfield North line Coldbrook street 6 Plainfield North line D. G. H. & M. R. R. grounds 6 Plainfield North line East Leonard street 8 Plainfield North line Madison avenue 8 Plainfield North line Quimby street 8 Quimby East line Canal street 6 Quimby East line Plainfield avenue 6 Quimby West line Plainfield avenue 6 Ransom South line Lyon street 4 Ransom North line Lyon street 4 Ransom North line East Fulton street 4 Reed </td <td>Pearl</td> <td>West, near end of Bridge (blow off)</td> <td>6</td>	Pearl	West, near end of Bridge (blow off)	6
Perry North line Page street. 4 Page East line Plainfield avenue. 6 Page West line Reed street. 6 Page West line North avenue. 6 Powell. East line Jefferson avenue. 4 Packard South line Lake avenue. 6 Packard North line Cherry street. 6 Plainfield. North line Coldbrook street 6 Plainfield. South line D. G. H. & M. R. R. grounds 6 Plainfield. North line East Leonard street 8 Plainfield. South line Madison avenue. 8 Plainfield. North line Quimby street. 8 Quimby. East line Canal street. 6 Quimby. East line Plainfield avenue. 6 Quimby. West line Plainfield avenue. 6 Ransom South line Lyon street. 4 Ransom North line Lyon street. 4 Ransom North line East Fulton street. 4 Reed North line Carrier street. 4	Prescott	West line South Division street	8
Page East line Plainfield avenue 6 Page West line Reed street 6 Page West line North avenue 6 Powell East line Jefferson avenue 4 Packard South line Lake avenue 6 Packard North line Cherry street 6 Plainfield North line Coldbrook street 6 Plainfield South line D. G. H. & M. R. R. grounds 6 Plainfield North line East Leonard street 8 Plainfield North line Madison avenue 8 Plainfield North line Quimby street 8 Quimby East line Canal street 6 Quimby East line Plainfield avenue 6 Quimby West line Plainfield avenue 6 Ransom South line Lyon street 4 Ransom North line Lyon street 4 Ransom North line East Fulton street 4 Reed North line Carrier street 4 Second avenue West line South Division street 4	Prescott	West of Buchanan street	6
Page West line Reed street 6 Page West line North avenue 6 Powell East line Jefferson avenue 4 Packard South line Lake avenue 6 Packard North line Cherry street 6 Plainfield North line Coldbrook street 6 Plainfield South line D. G. H. & M. R. R. grounds 6 Plainfield North line East Leonard street 8 Plainfield North line Madison avenue 8 Plainfield North line Quimby street 8 Quimby East line Canal street 6 Quimby East line Plainfield avenue 6 Quimby West line Plainfield avenue 6 Ransom South line Lyon street 4 Ransom North line Lyon street 4 Ransom North line East Fulton street 4 Reed North line Carrier street 4 Second avenue West line South Division street 4	Perry	North line Page street	4
Page West line North avenue 6 Powell East line Jefferson avenue 4 Packard South line Lake avenue 6 Packard North line Cherry street 6 Plainfield North line Coldbrook street 6 Plainfield South line D. G. H. & M. R. R. grounds 6 Plainfield North line East Leonard street 8 Plainfield South line Madison avenue 8 Plainfield North line Quimby street 8 Quimby East line Canal street 6 Quimby East line Plainfield avenue 6 Quimby West line Plainfield avenue 6 Ransom South line Lyon street 4 Ransom North line Lyon street 4 Ransom North line Lyon street 4 Reed North line Carrier street 4 Second avenue West line South Division street 4	Page	East line Plainfield avenue	6
Powell. East line Jefferson avenue. 4 Packard. South line Lake avenue. 6 Packard. North line Cherry street. 6 Plainfield. North line Coldbrook street 6 Plainfield. South line D. G. H. & M. R. R. grounds. 6 Plainfield. North line East Leonard street. 8 Plainfield. South line Madison avenue. 8 Plainfield. North line Quimby street. 8 Quimby. East line Canal street. 6 Quimby. East line Plainfield avenue. 6 Quimby. West line Plainfield avenue. 6 Ransom South line Lyon street. 4 Ransom North line Lyon street. 4 Ransom North line East Fulton street. 4 Reed. North line Carrier street. 4 Second avenue West line South Division street. 4	Page	West line Reed street	6
Packard South line Lake avenue 6 Packard North line Cherry street 6 Plainfield North line Coldbrook street 6 Plainfield South line D. G. H. & M. R. R. grounds 6 Plainfield North line East Leonard street 8 Plainfield South line Madison avenue 8 Plainfield North line Quimby street 8 Quimby East line Canal street 6 Quimby East line Plainfield avenue 6 Quimby West line Plainfield avenue 6 Ransom South line East Bridge street 4 Ransom South line Lyon street 4 Ransom North line Lyon street 4 Ransom North line East Fulton street 4 Reed North line Carrier street 4 Second avenue West line South Division street 4	Page	West line North avenue	6
Packard North line Cherry street 6 Plainfield North line Coldbrook street 6 Plainfield South line D. G. H. & M. R. R. grounds 6 Plainfield North line East Leonard street 8 Plainfield South line Madison avenue 8 Plainfield North line Quimby street 8 Quimby East line Canal street 6 Quimby East line Plainfield avenue 6 Quimby West line Plainfield avenue 6 Ransom South line East Bridge street 4 Ransom South line Lyon street 4 Ransom North line Lyon street 4 Reed North line Carrier street 4 Second avenue West line South Division street 4	Powell	East line Jefferson avenue	4
Plainfield. North line Coldbrook street 6 Plainfield. South line D. G. H. & M. R. R. grounds 6 Plainfield. North line East Leonard street 8 Plainfield. South line Madison avenue 8 Plainfield North line Quimby street 8 Quimby. East line Canal street 6 Quimby. East line Plainfield avenue 6 Quimby. West line Plainfield avenue 6 Ransom South line East Bridge street 4 Ransom South line Lyon street 4 Ransom North line Lyon street 4 Reed North line Carrier street 4 Second avenue West line South Division street 4	Packard	South line Lake avenue	6
Plainfield. South line D. G. H. & M. R. R. grounds. 6 Plainfield. North line East Leonard street. 8 Plainfield. South line Madison avenue. 8 Plainfield. North line Quimby street. 8 Quimby. East line Canal street. 6 Quimby. East line Plainfield avenue. 6 Quimby. West line Plainfield avenue. 6 Ransom South line East Bridge street. 4 Ransom South line Lyon street. 4 Ransom North line Lyon street. 4 Reed. North line Carrier street. 4 Second avenue West line South Division street. 4	Packard	North line Cherry street	6
Plainfield. North line East Leonard street. 8 Plainfield. South line Madison avenue. 8 Plainfield. North line Quimby street. 8 Quimby. East line Canal street. 6 Quimby. East line Plainfield avenue. 6 Quimby. West line Plainfield avenue. 6 Ransom South line East Bridge street. 4 Ransom South line Lyon street. 4 Ransom North line Lyon street. 4 Ransom North line East Fulton street. 4 Reed North line Carrier street. 4 Second avenue West line South Division street. 4	Plainfield	North line Coldbrook street	6
Plainfield. South line Madison avenue. 8 Plainfield North line Quimby street. 8 Quimby. East line Canal street. 6 Quimby. East line Plainfield avenue. 6 Quimby. West line Plainfield avenue. 6 Ransom South line East Bridge street. 4 Ransom South line Lyon street. 4 Ransom North line Lyon street. 4 Ransom North line East Fulton street. 4 Reed North line Carrier street. 4 Second avenue West line South Division street. 4	Plainfield	South line D. G. H. & M. R. R. grounds	6
Plainfield North line Quimby street. 8 Quimby. East line Canal street. 6 Quimby. East line Plainfield avenue. 6 Quimby. West line Plainfield avenue 6 Ransom South line East Bridge street 4 Ransom South line Lyon street 4 Ransom North line Lyon street 4 Ransom North line East Fulton street 4 Reed North line Carrier street 4 Second avenue West line South Division street 4	Plainfield	North line East Leonard street	8
Quimby East line Canal street 6 Quimby East line Plainfield avenue 6 Quimby West line Plainfield avenue 6 Ransom South line East Bridge street 4 Ransom South line Lyon street 4 Ransom North line Lyon street 4 Ransom North line East Fulton street 4 Reed North line Carrier street 4 Second avenue West line South Division street 4	Plainfield	South line Madison avenue	8
Quimby East line Plainfield avenue. 6 Quimby West line Plainfield avenue 6 Ransom South line East Bridge street 4 Ransom South line Lyon street 4 Ransom North line Lyon street 4 Ransom North line East Fulton street 4 Reed North line Carrier street 4 Second avenue West line South Division street 4	Plainfield	North line Quimby street	8
Quimby West line Plainfield avenue 6 Ransom South line East Bridge street 4 Ransom South line Lyon street 4 Ransom North line Lyon street 4 Ransom North line East Fulton street 4 Reed North line Carrier street 4 Second avenue West line South Division street 4	Quimby	East line Canal street	6
Ransom South line East Bridge street 4 Ransom South line Lyon street 4 Ransom North line Lyon street 4 Ransom North line East Fulton street 4 Reed North line Carrier street 4 Second avenue West line South Division street 4	Quimby	East line Plainfield avenue	6
Ransom South line Lyon street 4 Ransom North line Lyon street 4 Ransom North line East Fulton street 4 Reed North line Carrier street 4 Second avenue West line South Division street 4	Quimby	West line Plainfield avenue	, 6
Ransom North line Lyon street. 4 Ransom North line East Fulton street. 4 Reed North line Carrier street. 4 Second avenue West line South Division street. 4	Ransom	South line East Bridge street	4
Ransom North line Lyon street 4 Ransom North line East Fulton street 4 Reed North line Carrier street 4 Second avenue West line South Division street 4	Ransom	South line Lyon street	4
Ransom North line East Fulton street 4 Reed North line Carrier street 4 Second avenue West line South Division street 4	Ransom	-	4
Second avenue	Ransom	•	4
Second avenue	Reed	North line Carrier street	4
1	Second avenue	1	4
west fire South found Street	Second avenue	West line South Ionia street	4

STREET.	LOCATION.	Size.
Second avenue	West line Grandville avenue	4
Sixth avenue	West line South Division street	4
Seventh avenue	West line South Division street	4
Sinclair	North line East Bridge street	4
Sycamore	East line South Division street	4
Sycamore	West line Jefferson avenue	4
Sheldon	South line East Fulton street	6
Sheldon	South line Cherry street	4
Sheldon	South line Wealthy avenue	4
Sheldon	North line Wealthy avenue	4
South Division	South line East Fulton street	12
South Division	South line Cherry street	12
South Division	South line Wealthy avenue	12
South Division	North line Wealthy avenue	12
South Division	North line Second avenue	12
South Division	North line Fifth avenue.	12
South Division	South line Fifth avenue	. 8
South Division	North line Ninth avenue	8
South Division	for line Hall street	8
South Ionia	South line East Fulton street	6
South Ionia	South line Cherry street	6
South Ionia	North line Cherry street	6
South Ionia	North line Wealthy avenue	6
South Ionia.	South line Wealthy avenue.	6
South Ionia	South line Second avenue	6
South Ionia	North line Second avenue	6
South Ionia	North line Fifth avenue	· 6
South Ionia	South line Fifth avenue.	6
South Ionia	South line Ninth avenue	6
South Ionia	North line Ninth avenue	6
South Ionia	North line Hall street	6
South Prospect	South line East Fulton street	4
South Lafayette	South line East Fulton street.	
South Lafayette	South line Cherry street.	6
South Lafayette	•	6
South Lafayette	South line Wealthy avenue	6
South Lafayette	North line Wealthy avenue	
•	South line Blakeley avenue	
South Lafayette	North line Fifth avenue	6

73

STREET.	LOCATION.	Size.
Force Mains	In street opposite Pump Station	16
Force Mains	In street opposite Pump Station	10
Force Mains	In street opposite Pump Station	18
Force Mains	Check Valve	20
Force Mains	In Pump Station	10
Force Mains	In Pump Station	18
	19 valves on hydrant connections with force mains	6

STREET.	LOCATION.	Size.
Broadway	North line West Bridge street	12
Broadway	South line Fifth street	12
Broadway	South line Eighth street	12
Broadway	North line Eighth street	12
Broadway	North Ninth street	12
Broadway	North line Eleventh street	12
Broadway	South line West Leonard street	12
Broadway	North line West Leonard street	10
Broadway	South line Webster street	10
Butterworth	West line South Front street	8
Court	North line West Fulton street	6
Court	South line West Fulton street	12
Court	South line Shawmut avenue	6
Court	South line West Bridge street	6
Eighth	East line North Front street	16
Eighth	East line Broadway street	16
Fourth	West line Broadway street	8
Fourth	West line "D" street	s
Fourth	West line Stocking street.	6
Fourth	East line Stocking street	G
Fourth	West line Fremont street	6
Fifth	West line Broadway street.	8
Fifth	West line Seward street	 H
First	West line Fremont street	4
First	East line Fremont street.	•
Gold	South line West Bridge street.	1
Gold	South line Shawmut avenue.	•
Gold	North line Shawmut avenue	•
Gold	1	•
Gold	South line West Fulton street.	_
Gold		8
	North line Butterworth avenue.	4
Jackson	East line Indiana street	6
Jackson	West line Indiana street	-
Jackson	East line South Pine street	6
Michigan	North line West Bridge street	6
Michigan.	South line Fourth street	4
Mt. Vernon and alley		4
Mt. Vernon and alley	South line West Bridge street	4

STREET.	LOCATION.	Size.
North Front	North line West Bridge street	6
North Front	South line Fourth street	6
North Front	South line Eighth street	6
North Front	North line Eighth street	6
North Front	South line West Leonard street	4
North Jefferson	North line West Bridge street	4
North Jefferson	South line Third street	4
North Pine	North line West Bridge street	6
Peaslee	West line Indiana street	4
Peaslee	East line Indiana street	4
Summer	South line West Bridge street	4
Summer	North line Shawmut avenue	4
Summer	South line Shawmut avenue	4
Summer	North line West Fulton street	4
Second	West line Broadway street	4
Second	West line Seward street	4
Second	East line Stocking street.	4
Seventh	West line Broadway street	10
Seventh	West line Alpine avenue	10
Seventh	East line Alpine avenue	10
Seward	South line Fifth street	Ġ
Scribner	North line West Bridge street	6
Scribner	North line Eighth street	8
Scribner	South line Eighth street	6
Scribner	South line West Leonard street	к
Scribner	North line West Leonard street	8
Shawmut	West line South Front street	6
Shawmut	East line Summer street	6
Shawmut	East line Winter street	6
Shawmut	East line Jefferson street	G
Straight	South line West Bridge street	6
Straight	North line Jackson street	6
Straight	South line Shawmut avenue	6
Straight	South line West Fulton street	6
Straight	North line West Fulton street	6
Straight	North line Butterworth avenue	. 8
South Front	Sonth line West Bridge street.	6
South Front	North line Butterworth avenue	12

STREET.	LOCATION	Size.
South Front	South line Butterworth avenue	8
South Jefferson	South line West Bridge street	4
South Jefferson	South line Chatham street	4
South Jefferson	South line Shawmut avenue	4
South Jefferson	North line Shawmut avenue	4
South Jefferson	North line West Fulton street	4
South Jefferson	South line West Fulton street	4
South Jefferson	North line Butterworth avenue	4
Stocking	North line West Bridge street	8
Stocking	South line Fourth street	8
Stocking	North line Fourth street	6
Stocking	South line Seventh street	6
South Pine	South line West Bridge street	6
South Pine	North line Jackson street	6
Third	West line Broadway street	4
Third	West line Seward street	6
Third	East line Stocking street	6
Turner	North line West Bridge street	6
Turner	South line Fourth street	4
Turner	South line Eighth street	6
Turner	North line Eighth street	6
Turner	North line Eleventh street	4
Turner	North line West Leonard street	4
Turner	South line West Leonard street	4
Turner	South line Webster street	4
West Bridge	East line North and South Front street	4
West Bridge	East line Summer street	12
West Bridge	West line Broadway street	12
West Bridge	West line North and South Jefferson street	12
West Bridge	East line North and South Jefferson street	13
West Bridge	West line Indiana street	12
West Bridge	West line North and South Pine street	8
West Bridge	On fire hydrant connections	6
West Fulton	West line South Front street	12
West Fulton	East line Winter street	12
West Fulton	West line Winter street	j 8
West Fulton	East line Gold street	8
West Fulton	East line Straight street	. 12

STREET.	LOCATION.	Size
West Fulton	East line Indiana street	
West Fulton	West line Indiana street	1 1
West Leonard	East line Scribner street	
West Leonard	West line Scribner street	1
West Leonard	West line Broadway street	1
West Leonard	East line Broadway street	. 1
West Leonard	East line Alpine avenue	1
West Broadway	South line West Bridge street	1
Vest Broadway	South line Shawmut avenue	
Vest Broadway	North line Shawmut avenue	1
West Broadway	North line West Fulton street	i
West Broadway	South line West Fulton street	
Vest Broadway	North line Butterworth avenue	i
Vatson	East line Indiana street	-
Vatson	West line Indiana street	.
Vatson	East line Straight street	· 1
Winter	South line West Bridge street	
Winter	South line Shawmut avenue	
Winter	North line Shawmut avenue	1
Winter	North line West Fulton street	1
Webster	East line Scribner street	!
	·	, -
DIAMETER INCHES		6
		_ -
		31 10
West Side	2 25 6 19	43 4

TOTAL PIPE LAID.

	4	9	x o	10	21	=	91	- 81	20	7 7	TOTAL MILES.
:	30,420	27,841	4,692	4,829	2,698	1,322 14,537	14,537	•			16.35
Low Service, East Side 32,835	32,835	60,179	19,984	60,179 19,984 10,373 22,116	22,116	:	4,870	125	4,477	4,477 1,590	29.65
Low service, West Side 25,154	25,154		11,912	22,556 11,912 5,311 18,709	18,709	:	973	973		:	16.02
Wyckoff pipe, East Side	1,375	5,311	658			:		:	:	:	1.40
Wyckoff pipe, West Side.	3,188	5,497	4,533	:		:	i	:	:	:	2.50
Totals 92,972 121,384 41,779 20,518 43,523 1,322	92,972	121,384	41,779	20,518	43,523	1,322	20,380	125	1,477	1,590	65.92

		65.92	636	503
Miles of cast iron mains 62.02	Miles of Wyckoff pipe	99	Number of Public Hydrants	Number of Gate Valves

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Eighteenth Annual Report

OF THE

BOARD OF PUBLIC WORKS

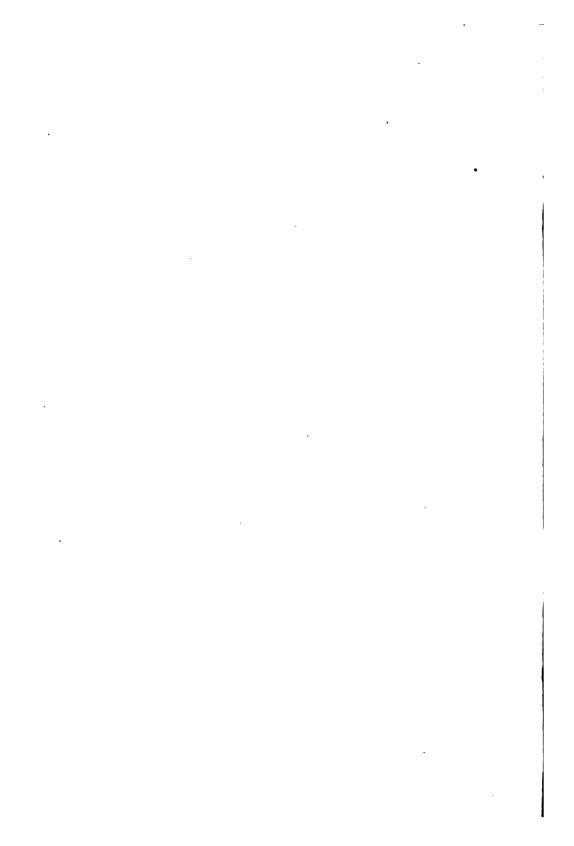
OF THE CITY OF

Grand Rapids, Michigan

FOR THE FISCAL YEAR ENDING APRIL 30th, 1891

GRAND RAPIDS, MICH.

DEAN PRINTING AND PUBLISHING COMPANY
1891



ANNUAL REPORT

OF THE

Board of Public Works

TO THE

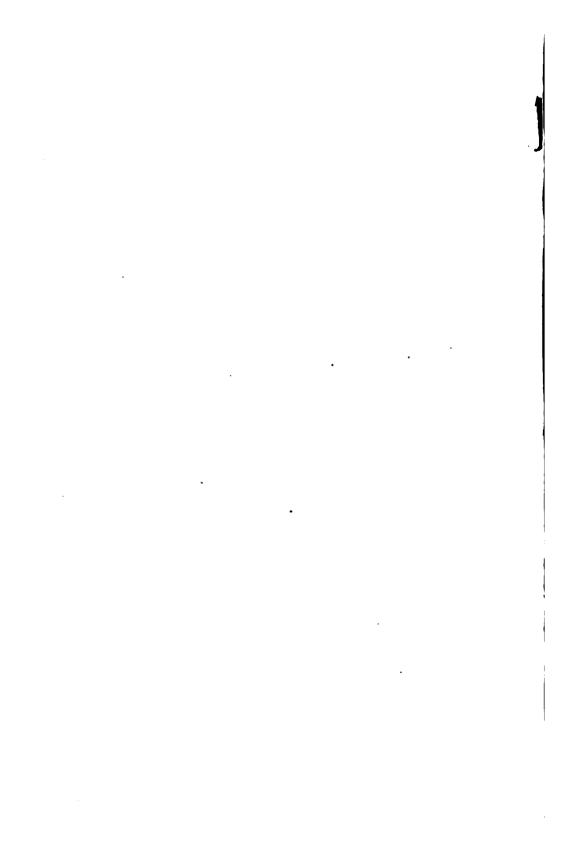
Common Council of the City of Grand Rapids,

TRANSMITTING THE REPORTS OF

THE COLLECTOR. CITY ENGINEER, ENGINEER OF PUMPING WORKS, AND INSPECTOR OF WATER WASTE.

The Fiscal Year Ending April 30, 1891.

GRAND RAPIDS, MICH.: THE DEAN PRINTING AND PUBLISHING Co. 1891.



Board of Public Works.

JAMES N. DAVIS, PRESIDENTTerm	expires	May,	1892
EDWIN F. UHL, MAYORTerm	expires	May,	1892
$W.\ R.\ SHELBY \dotsTerm$	expires	May,	1894
FRANCIS LETELLIERTerm	expires	May,	1893
ELI F. HARRINGTONTerm	expires	May,	1893
JOSEPH A. McKEE Term	expires	May,	1894

OFFICERS.

H. A. COLLARCity Engineer
FRED A. TWAMLEY Secretary and Collector
THOMAS J. WILLARD Assistant Collector
GEORGE E. KIRK Engineer of Pumping Works
JOHN VAN AMBERGSupt. of Repairs and Construction
A. PER LEE

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REPORT OF THE BOARD.

OFFICE OF THE BOARD OF PUBLIC WORKS.

To the Honorable, the Common Council of the City of Grand Rapids:

GENTLEMEN:—In compliance with the usual custom, the annual reports of the City Engineer, Clerk of the Board of Public Works, Engineer of the Pumping Station, and Water Waste Inspector are herewith transmitted.

From the City Engineer's report on streets, we find that grade lines have been established on twenty miles of streets, and one and fourteen one-hundredths miles of alleys.

The condition of the streets, within the old corporate limits, is as follows:

	Miles
Graded and paved with Trinidad asphalt	0.219
Graded and paved with wood and cobble stone, on gravel	
foundation	5. 57 ⁸
Graded and paved with wood, on gravel foundation	2.270
Graded and paved with wood, on plank foundation	0.490
Graded and paved with cobble stone, on gravel foundation	1.334
Graded, with gravel roadway and cobble stone gutters	61.747
Graded, with gravel roadway and gutters	32.373
Graded	7.172
Unimproved	56.835
Total	168.018

The extent of streets has been increased by street opening and platting 15.066 miles.

SEWERS.

Sewer construction during the year amounts to 5.627 miles, which added to previous construction makes an aggregate of 50.015 miles now in use. Of the total extent, 17.168 miles are brick, varying in size from 16x24 inches in diameter to 48x72 inches.

No sewers in the recently annexed territory is included in the above, as the time since the annexation has been so short that surveys could not be made to ascertain their size or extent.

The report of the Engineer gives the particular localities and construction of this branch of public work.

BRIDGES.

The work on bridges is confined to re-planking the roadway of the Fulton street bridge, and the painting of the Fulton street, Pearl street, Bridge street, and Sixth street bridges. The cost of material and labor of the above work amounts to \$3,135.87.

GROUND WATER SUPPLY.

In accordance with authority granted by your honorable body, the Cook Well Company of St. Louis, Mo., sunk a number of wells, to ascertain whether there was a sufficient quantity of wholesome ground water to supply the city. As the result of said test, the said company made a proposition (page 879 printed proceedings 1890-1891) to enter into a contract with the city to furnish an inexhaustible daily supply of 10,000,000 gallons, and no pay in case of a failure on their part.

PARKS.

The work of improving Lincoln Park was continued, the grading of the walks completed, and most of the low ground filled, water mains laid and hydrants set, sufficient to do necessary sprinkling. The total expenditures for the year was \$2,244.03.

A topographical survey of John Ball Park was made, and a plan for its improvement adopted. The cost of survey and plan was \$483.60.

A large fountain was purchased for Fulton Street Park, and there was expended in its purchase, erection, freight, and water connections, the sum of \$6,585.77.

Plans for the improvement of Highland Park have been adopted, embracing about 2,000 feet of walks, a summer house, utilizing Coldbrook for a lakelet, and arranging for a picnic ground. No expense has been incurred in construction.

The total amount expended for streets, sewers, bridges, parks and water mains, during the year, is as follows:

Street improvements \$ 71	, 330.00
Sewers	,640.00
Bridges 3	, 135.87
Parks 9	, 313.40
Water Mains	,819.30
Total \$116	,238.57
The total expense in the Engineer's office, for salaries, transportation and supplies, is \$ 4	,937.39
The report of the Clerk of the Board of Public Works shows that the cost of maintenance and repairs of the water system for the year ending April 30, 1891,	
was\$ 30	
Receipts from water rates and permits 50	,665.82
Excess of receipts over cost of maintenance and operation\$ 19	,889.70
Total receipts from May 1, 1874, to May 1, 1891\$421 Total cost of maintenance and operation to May 1, 1891 261	
Excess of receipts over expenditures	, 566.89
Total cost of Works to May, 1891	

No credit has ever been given to the Water Works system for fire protection, which makes it appear at first sight that the water system does not make a good financial showing. But taking into consideration the reduction of insurance rates on the residences, manufacturing plants, and all property liable to destruction by fire, it clearly shows that a water plant is the best paying investment that any municipality can make.

To illustrate: Information from insurance headquarters shows that the amount of property insured in this city is from \$20,000,000

to \$22,000,000. The rates of insurance are from one-fourth of one per cent. to five per cent. per annum. Before the establishment of the present efficient fire department and the existence of our water system rates of insurance were from one per cent. to ten per cent. per annum. From the same source we learn that the amount of property insured is equally divided between low and high rates, and that the average reduction in insurance is fully two per cent., in consequence of the facilities for extinguishing fire. This would make a saving to our citizens of at least \$400,000 per annum from this source alone during the past year. Gallons

The report of the Engineer at the pumping station shows
that the average daily consumption of water is 4,392,193
Average daily consumption of water for 1890 3,315,119
Daily increase 1,077,074
The cost of running the pumping station is as follows:
Salaries \$ 5,300.00
Coal 11,934.51
Lights, oil, packing, rubber valves, etc 689.83
Repairs to engines and boiler 274.89
Repairs to engine and boiler house roof
Total
The Inspector of Water Waste reports as follows:
Total number of premises supplied with water un-metered 3,645
Number of fixtures
Number of inspections
Number of leak; discovered
Number of notices served on consumers 322
Number of notices to plumbers and drain layers to fill trenches
in streets, etc94
Respectfully submitted,

JAMES N. DAVIS, W. R. SHELBY, FRANCIS LETELLIER, ELI F. HARRINGTON, JOSEPH A. MCKEE.

Board of Public Works.

SECRETARY'S REPORT.

Office Board of Public Works, Grand Rapids, Michigan, May 1, 1891.

To the Honorable Board of Public Works:

GENTLEMEN—I respectfully submit to your honora following report for the year ending April 30, 1891:	ble body the
The number of services connected with the city's works on the first of May, 1890, for which permits were issued, were	3,229
Number of services put in the past year, for all of which permits were issued	. 496
Total Number of special connections existing May 1, 1891	3,725 94
Total number of connections on May 1, 1891 Number of services now cut off	3,819 528
Number of services now open	3,291
From water rates, fines, etc	\$ 49,493 32 1,172 50
Total income from water works	50,665 82 5,252 45
Total receipts for the year	55,918 27 1,522 87
Total	57,441 14

Deposits have been made with the City Treasur	er during t	he
year as follows:		
To the credit of the water works income fund	\$ 51,846	99
To the credit of the water works fund	3,875	07
To the credit of general fund	45	00
To the credit of first and second district sewer fund	-	00
To the credit of the bridge fund	450	00
Total deposits during the year		
Cash on hand to balance	1,119	о8
Total	\$ 57,441	14
Receipts from May 1, 1874, the commencement o	f collection	ns,
to May 1, 1890:		•
From water rates, fines, etc	\$356,746	95
From water permits	13,609	98
From various sources (per past reports)	11,861	81
Total	\$382,218	74
Receipts for the past year	55,918	27
Total receipts to date	\$438,137	01
Deposits from May, 1874, to May 1, 1890:		
To the credit of the water works income fund	\$369,971	56
To the credit of various funds (per past reports)		
	10,724	31
Total		
Total Deposits made the past year	\$380,695 56,322	87 o6
Total	\$380,695 56,322	87 o6

STATEMENT OF EXPENDITURES.

MAY 1, 1890, TO MAY 1, 1891.

CONSTRUCTION OF WATER WORKS.

1-PIPE SYSTEM.

Extension of mains	\$8,027	77		
Relaying of mains	2,588	93		
	•	\$	10, 6 16	7 0
2—Pumping Machinery, etc., 1	Low Se	ERVICE	•	
New fly wheel, etc				
Turning round boiler, etc	153	51	- 6	
		·	1,69 7	73
3—Pumping Machinery, etc., H	ligh Se	ERVICE		
Smith-Vaile pump and connections			2 ,069	54
4-River and Well Conn	ECTIONS	5.		
Filter and crib	\$ 601	27		
New suction pipe and foot valve	1,007	96	- 6	
·			1,609	23
5—Buildings.				
Coal shed			93	05
6—Meters.				
New meters and setting			345	6о
. 7—New Water Supp	LY.			
Test wells			1,824	70
Total		\$	18,256	5 5
Paid previous to May 1, 1890			341,803	67
Cost of works to date		\$8	360,060	22
Six hundred and twelve thousand do represented by outstanding bonds of the city		this	amount -	is

MAINTENANCE AND OPERATION OF WATER WORKS.

1-PUMPING.

Salary engineer	\$ 1,500	00
Salary assistant engineer	900	00
Salary second assistant engineer	78 0	00
Salary first fireman	600	00
Salary second fireman	6 0 0	00
Salary third fireman	500	00
Salary fourth fireman	420	00
Fuel	14,833	45
Repairs to machinery, suction pipe and foot valve	532	70
Repairs to pump house	119	52
Supplies (oil, packing, etc.)	948	03
Telephone	40	00
Incidentals	22	00
	\$21,795	70
2—Office and Collecting.		
One-fourth salary clerk and collector	\$ 375	00
Salary assistant collector	720	00
Salary second assistant (one-half)	240	00
Books, stationery and printing	72	07
Stamps and postals	79	40
Incidentals	23	16
-	\$1,509	63
3—Repairs and Inspection.		
Salary of superintendent of repairs and construction	\$1,200	00
Salary of inspector of water waste	960	00
Iron pipe	301	00
Wyckoff pipe	161	22
Filter and Intake	209	40
Reservoir	112	25
Hydrants	864	20
Valves	184	95
Meters	1,050	93
Service connections	1,367	89

Tools and supplies	8	442	17
Barn and horse		332	59
Blowing off		192	25
Shop and storehouse		29	74
Telephone at foreman's residence		40	00
Incidentals		22	20
		\$7,470	 79
RECAPITULATION.			
Pumping	\$	21,795	70
Office and collecting		1,509	63
Repairs and inspection		7,470	79
Total paid for maintenance and operation Paid for maintenance and operation previous to May	\$	30,776	12
1, 1890	2	230,679	74
Paid during past year		30,776	12
Total paid for maintenance and operation to date	\$:	 261,455	 86
Income for the year		50,665	82
Cost of maintenance and operation		30,776	I 2
Excess of receipts over expenditures	1	5 19,889	 70
Of the 452 meters last reported 18 of them have	: b	een fou	ınd

Of the 452 meters last reported 18 of them have been found unfit for further service, and are not accounted for. The balance, with the 25 meters purchased during the year, make 459 meters owned by the city, as follows:

NAMES OF METERS.	Running	In Shop	Total
Ball & Fitts Rotary	61	2	63
Worthington	238	• 15	258
Crown	66	11	77
Ball & Fitts Piston	19	0	19
Duplex	36	2	38
Hersey	4	0	4
Thompson.,	5	0	5
Total.	429	30	459

Thirty-six leaks on mains have been repaired; of these 13 were on Wyckoff pipe, and 23 on iron pipe.

Two hundred and forty-six permits to connect with the public sewers were issued during the year.

Respectfully submitted,

Fred A. Twamley,

Secretary and Collector.

Engineer of Pumping Works Report.

GRAND RAPIDS PUMP HOUSE, May 1st, 1891.

To the Honorable Board of Public Works:

GENTLEMEN: —I have the honor to submit the Engineer's report for the year ending May 1st, 1891.

Since the relaying of the suction pipe from the pump well on the bank of the river to the north engine, all difficulty with air getting into the pumps has been removed, which was a source of great annoyance before, besides much harder work on the pumps, and would in time have caused a break in the pumps or force main; now the engine is working very satisfactorily, with no trouble whatever.

Fairbanks, Morse & Co., the contractors for the Smith-Vaile pumps, have changed the force main and pump caps on the hill engine, by straightening out and enlarging the water ways, which has improved the working of the engine very materially.

Quite a little trouble was experienced this winter during the cold weather with anchor ice running in the river and stopping up the filter. At times we were obliged to stop one engine, notwith-standing we kept a man raking at the crib between the hours of 5 and 9 o'clock in the morning.

The engines and boilers are in very good repair, and if no accident happens to them will need but very little expense to be kept in running order the coming year.

The average daily consumption of water for the year has been 4,392,193 gallons.

Against an average the previous year of 3,315,119 gallons. An increase of 32 per cent.

Total cost of fuel to pump 1,000,000 gallons of water into the high and low systems, \$7.41.

Against a cost the previous year of \$8.58.

Total cost of pumping, \$11.42.

Total number of gallons of water pumped into standpipe, 469, 152, 240.

The running expenses for the year have been:

For repairs to engines and boilers	\$ 274.89
For repairs to engine and boiler house roof	113.00
For lights, oil, packing, waste and rubber valves	689.83
For salaries of engineers and firemen	5,300.00
For coal delivered to boilers	11,934.51
Total	4 18 212 22

The estimated amount of coal on hand May 1st, 1891, is 300 tons.

The following table shows the number of days run for each month, number of revolutions made, gallons of water pumped, and amount of coal burnt for pumping and raising steam, and the cost of the same:

MONTH	DAYS RUN	TOTAL TIME RUN	No. of Revolu- tions	GALLONS OF WATER PUMPED	Pounds of Coal Burnt	Cost of Coal	POUNDS OF COAL RAIS-	COST OF COAL RAIS- ING STEAM	TOTAL COST OF COAL
May	31	1385:10	1,160,640	107,417,000	532,518	\$ 922.20	1500	\$ 2.62	\$ 924.82
June	30	1397:25	1,389,665	129,776,550	695, 169	1,331.20	2200	8.85	1,885.05
July	31	1399:30	1,253,278	160,209,720	677,950	1,084.32	1600	2.40	1,086.72
August	81	1815:05	1,185,501	150,685 500	666,900	977.00	2700	3.97	980.97
September	30	1245:25	1,062,883	146,176,230	647,817	967.18	3300	4.83	971.96
October	31	1157:40	969,752	136,213,460	608,305	909.45	3200	4.71	914.16
November	30	974:00	982,013	121,554,440	585,115	858.54	2698	4.00	862.54
December	31	1457:20	1,512,696	138,463,480	747,460	1,095.02	3918	5.73	1,100.75
January	31	1481:05	1,472,015	135,509,000	743,511	1,116.17	2192	3.34	1,119.51
February	28	1208:50	912,214	121,416,120	530,256	884.52	2457	8.84	838.36
March	31	1329:35	998,988	129,222,400	538,827	923.23	2275	3.90	927.13
April	30	1287:10	892,320	126,506,600	506,695	868.98	2034	3.56	872.54
TOTAL	365	15638:15	13,691,965	1,603,150,500	7,480,023	\$11,887.76	30074	\$46.75	11,934.51

Respectfully submitted,

INSPECTOR'S REPORT.

OFFICE	BOAR	D OF	Publi	c W	ORKS.			1
G	RAND	RAPH	s, Mi	сн:,	May	I,	1891.	(

To the Honorable Board of Public Works:

Gentlemen:—I respectfully submit the following report for the year ending April 30, 1891:

Total number of premises supplied with city water (not metered), 3,645. Total number of fixtures, 9,359, as follows:

Baths	685
Closets	2,453
Wash basins	484
Sink faucets	1,517
Urinals	6 8
Hydrants, sill cocks and street washers	3,780
Miscellaneous	372

Which have had careful inspection, with the following result:

Number of inspections made	4,818
Number of leaks discovered	141
Number of notices served on water consumers	322
Notices to plumbers and drain layers	94
Number of services shut off	245
Number of services turned on	91

The following table shows the kind, number and location of water fixtures.

WARDS	Ватнѕ	CLCSETS	WASH BASINS	SINK FAUCETS	HYDRANTS, SILL COCKS AND ST. WASHERS	URINALS	MISCELLANEOUS	PREMISES
First	36	207	29	178	425	6	30	425
Second and Fourth	121	612	88	325	900	16	54	777
Third and Tenth	298	1161	270	661	1436	11	153	1162
Fifth	6	32	6	34	148		10	145
Sixth and Seventh	35	240	25	144	485	5	28	531
Eighth and Ninth	30	181	31	143	342	9	• • • • •	355
School and Engine Houses	5	20	35	37	44	21	62	
Total	685	2453	484	1517	3780	68	372	3693
GRAND TOTAL		ļ	ļ	ļ				9359

Respectfully submitted,

A. PER LEE,

Inspector.

CITY ENGINEER'S REPORT.

OFFICE BOARD OF PUBLIC WORKS, GRAND RAPIDS, MICHIGAN, MAY 1, 1891.

To the Honorable Board of Public Works:

Gentlemen—I have the honor to present herewith my eighth annual report of public works brought to completion under the direction of your honorable body, which comprises work done in the fiscal year ending April 30, 1891.

STREETS.

During the year grade lines for streets to the extent of 21 miles' and for alleys 1.14 miles have been adopted.

The table following gives name and location of streets and alleys, and length of each for which grade lines have been adopted:

STREET.	FROM	то	LE'IH FERT.
Antisdel Court	Lyon	North	244
Kennedy	Henry	South Union	592
Martha	Grandville avenue	Godfrey avenue	735
Mechanic	North Union	North East	1110
Grand avenue	East Fulton	Fountain	758
Tenth	North Front	Broadway	833
Ninth	Broadway	Tamarack	3552
Tamarack	Walker avenue	West Leonard	2262
North Lafayette	Bradford	Cedar	1300
Worden	South East	Madison	2565
Prince	. South East	Madison	2565
South Union	Fifth avenue	Prince	626
Godfrey avenue	Hall	Fifth avenue	1750
Wallen	Hall	Ninth avenue	1264
Henry	. Fifth avenue	South of Prince	793

STREET.	FROM	то	LE'TH FEET.
Turner	West Bridge	North	7794
Cadwell	West Bridge	First	380
Thompson court	Blakeley	Pleasant	484
Valley	South Front	Winter	1059
Bowery	South Front	Winter	1059
Myrtle	Alpine avenue	Grand River	3631
Legrand	Gill	North avenue	1677
Mt. Vernon	West Bridge	Watson	3286
Logan	Henry	South East	593
Bissell	Flat	118 north of Lydia	845
Grand	Flat	118 north of Lydia	850
North East	Flat	118 north of Lydia	544
Dudley place	East Bridge	North Union	249
Hanover court	Plainfield	North Forrest	559
State	Jefferson avenue	Cherry	1476
North Pine	Walker avenue	West Leonard	2076
Powers	Walker avenue	West Leonard	1896
Lincoln	Walker avenue	West Leonard	1610
Quarry	Eleventh	West Leonard	1248
Eleventh	Alpine	West	2562
Nagold	Stocking	Fremont	687
North avenue	Cedar.	D., G. H. & M. R. R	2050
Oak avenue	Grand	North Union	695
Innis	Grand.	North Union	603
Washington	Jefferson avenue	1	1909
Caulfield avenue	250 north of Briggs avenue	Hall	1573
Sheridan	374 north of Briggs avenue	Hall	1574
Fifth avenue	Grandville	Godfrey avenue	1480
Briggs avenue	Grandville.	Sheridan	564
Hughart	Grandville	Sher:dan	673
Pleasant avenue	North avenue	North Union	1261
Bradford	Coit avenue	North College avenue	1916
Hall	Grandville	G. R. & I. R. R.	1193
Cass	Fifth	Hall.	
North Prospect	Bradford	Cedar	2578 1247
"B"	Grandville.	Godfrey.	804
Prospect place	East Bridge	-	613
Prospect place	Fifth avenue	Hastings	
North Ionia			2576
	Monroe	East Fulton	495
Matilda	Coit avenue	North avenue	1256

STREET.	FROM	то	LE'TH FEET.
Oakland	"В"	Fifth	780
Bostwick	Lyon	Park	1019
Trowbridge	North Lafayette	North avenue	592
Cherry	Madison	South East	2638
Hamilton	West Leonard	North st	2565
Quarry	West Leonard	North st	2564
Elizabeth	West Leonard	South	, 870
West Fulton	West side ditch	John Ball Park	1310
East Fulton	South East	East city limits	5241
Wealthy avenue	South East	East city limits	5181
Cherry	South East	Lake avenue	1450
Jefferson avenue	Hall	Burto	5023

ALLEYS.

BETWEEN	FROM	OT	Le'тн Гккт.
Taylor st. and Plainfield av	Grove	Grove	573
Ottawa and North Ionia	East Bridge	Hastings	500
N. Prospect and N. Lafayette	Trowbridge	Fairbanks	500
N. Prospect and North av	Trowbridge	Fairbanks	500
Coit av. and Clancy	Bradford	Matilda	650
Lyon and Pearl	Campau	Grand River	212
Benson and North Union	Alley	D,. G. H. & M. R. R	672
North of East Bridge	Benson	North Union	300
Third and Fourth	"D"	East	368
Second and Third	Pettibone	North Lane	762
Bostwick and Rausom	Crescent	Kast Bridge	525
N. Prespect and N. Lafayette	Hastings	Trowbridge	500

The following table shows the streets and alleys under contract and improvements completed during the year:

TABLE OF STREET AND ALLEY IMPROVEMENTS BROUGHT TO COMPLETION DURING THE YEAR, SHOWING THE KIND

OF IMPROVEMENT AND COST THEREOF.

STREET	FROM	TO	KIND OF IMPROVEMENT	CONTRACT	CONTRACT ESTIMATED PRICE INCIDENTALS.	Total	NAME OF CONTRACTOR
First street	Broadway street	Michigan street	Michigan street Graded, graveled and gutters paved	\$ 3,800.00	\$ 160.00	5 3,960.00	\$ 3,960.00 J. McDermott
Eleventh avenue		South Ionia street .	South Ionia street . Graded, graveled and gutters paved	786.00		830.00	830.00 J. De Bruen
Nagold street Benson street		Fremont street D.,G. H. & M. R.R.	Mocking street Fremont street Graded and graveled	363.64 3,345.00	36.36 115.00	420.00	420.00 M. Tennis 460.00 R. Pickett
Twelfth avenue Eighth avenue		M. C. R. R Agnew avenue	South Division st. , M. C. R. R Graded, graveled and gutters paved	2,980.00	120.00	3,100.00 1,330 00	8,100.00 J. De Bruen 1,330 00 J. De Bruen
Wealthy avenue		Madison avenue	South Division st Madison avenue Graded, graveled and gutters paved, stone curb	6,096.00	154.00	6,250 00	6,250 00 Mathewson&Kloote
Rumsey street	Grandville avenue. South East street	Hilton street	Hilton street Graded, graveled and gutters paved South Union street Graded, graveled and gutters paved	3,066.00	82.00	1,030.00 3,180.00	1,030.00 J. Drieburg 3,180.00 J. McDermott
Delony street		Veto street	Graded and graveled	1,150.00	100.00	1,250.00	1,250.00 R. Pickett
West Fulton street		South Front street Straight street Canal street Taylor street	Paved with cedar block, stone curb Graded, graveled and gutters paved	16,400.00	300.00 ND 00	1,820.00	6,700.00 Mathewson&Kloote 1,820.00 W. D. Hembling
North Prospect st	Trowbridge street	Fairbanks street	North Prospect st Trowbridge street Fairbanks street Re graded, graveled and gutters paved	00.000	-	900.00	
nogadone avenue West Leonard street	Butterworth avenue Alpine avenue	L. S. K. M. S. K.y. The bridge	Butterworth avenue L. S. K. M. S. K. y. Graded and graveled	375.00 8,150.00	85.00 190 60	460.00	Fred Wheeler Wagemacher & Schneider
Kennedy street	Kennedy street Henry street		Kennedy street, Henry street South Union street Graded, graveled and gutters paved	1,200.00	100 00	1,300.00 640.00	100 00 1,300.00 J. McDerniott 72:00 640.00 J. De Bruen

STREET AND ALLEY IMPROVEMENTS BROUGHT TO COMPLETION DURING THE YEAR.-CONTINUED.

NAME OF CONTRACTOR	W. D. Hembling	T. Martin	1,730.00 C. Prange	90.00 L. Schneider	410.00 Myer & Rens	800.00 W. D. Hembling	130.00 M. Tennis
FOTAL COST	\$1,180.00	<u></u>	1,730.00	90.00	410.00	800.00	130.00
CONTRACT ESTIMATED TOTAL PRICES INCIDENTALS COST	\$ 80.00	Private arrangemen ts	100.00	18.00	53.00	70.76	49.08
CONTRACT	\$ 1,100.00		1,630.00	72.00	357.00	729.24	80.94
KIND OF IMPROVEMENT	Hanover court Plainfield avenue North avenue Graded, graveled and gutters paved \$ 1,100.00 \$ 80.00 \$1,180.00 W. D. Hembling	West Bridge street. First street Graded, graveled and gutters paved	Caledonia street Plainfield avenue. Taylor street Graded, graveled and gutters paved	Alley bet. Broadway Fourth street South Graded and graveled	Alley between Bost. Crescent avenue East Bridge street Graded	Alley between Kent East Bridge street. Hastings street Graded and paved with stone	Alley between Sec- ond and Third sts. Pettibone street Fremont street Graded and graveled
ОТ	North avenue	First street	Taylor street	South	East Bridge street	Hastings street	Fremont strect
FROM	Plainfield avenue	West Bridge strect.	Plainfield avenue	Fourth street	Crescent avenue	East Bridge street	Pettibone street
STREET	Hanover court	Cadwell street	Caledonia street	Alley bet. Broadway and D streets	Alley between Bost- wick and Ransom.	Alley between Kent and Ottawa streets	Alley between Second and Third sts.

The streets within the old corporate limits, in miles, are conditioned as to kind of improvements, as follows:

	Miles
Graded and paved with Trinidad asphalt	0.219
Graded and paved with wood and cobble stone, on gravel	
foundation	5.578
Graded and paved with wood, on gravel foundation	2.270
Graded and paved with wood, on plank foundation	.490
Graded and paved with stone (cobble), on gravel	1.334
Graded, with gravel roadway and cobble stone gutters	61.747
Graded, with gravel roadway and gutters	32.373
Graded	7.172
Unimproved	56.835
Total	68.018

Street openings and plattings have added to the length of streets in the city 15.066 miles.

Extension of the limits of the city at the present session of the Legislature has largely increased the mileage of streets. Want of reliable data renders it impossible to include length of streets in the new territory at this time.

SEWERS.

The table following shows the amount of sewerage constructed during the year. There is under contract a trunk sewer for the drainage of the north-eastern portion of the city, the construction of which was commenced late last fall and is now in progress, but is not included in the above mentioned tables.

I include with this report, as an appendix, a complete list of public sewers, which shows kind of material, size, length, and year of construction.

TABLE SHOWING LOCATION, KIND, SIZE, LENGTH, COST, ETC., OF SEWERS CONSTRUCTED DURING THE YEAR.

ESTIMATED TOTAL NAME OF COST COST COST COST	\$ 80.00 \$ 850.00 J. De Bruen	44.22 230.00 M. Tennis	33.00 160.00 J. Owens		350.00 2,500.00 Mathewson&Kloote		100.00 1,040.00 Collins & O'Hara	114.70 650.00 M. Tennis 5	71.50 880 00 J. Myer	62.88 350.00 M. Tennis	- 00 00	90.00 +90.00 L. Schneider	J. Myer	178.29 1,400.00 M. Tennis	81.00 420.00 J. Owens		110.00 900.00 J. Owens	57.00 400.00 L. Schneider	88.00 160.00 L. Schneider	160.00 1,960.00 H. Wagemacher
CONTRACT	\$ 270.00	185.78	127.00		2,150.00		940.00	585.30	308.50	287.12	-	400.00	756.00	1,221.71	339.00		790.00	343.00	122.00	1,800.00
LENGTH IN FRET	\$14	873	366	573	283 267 240	2 28	35	1807	716	428	989	220	88	525		92	229	450	888	1126
Мамносяя Сатсн- Вазіна	:	<u>:</u>	<u>:</u>	*	- 01		*	<u>:</u>	.: 67	_ <u>:</u>	<u>:</u>	<u>:</u>		:		_:			_ :	9
SIZE AND KIND	1	9-inch glazed pipe	9-inch glazed pipe	9-inch glazed pipe	12-inch glazed pipe 15-inch glazed pipe 20-inch glazed pipe	20-inch glazed pipe (15-inch glazed pipe	12-inch glazed pipe	9-inch glazed pipe	12-inch glazed pipe	9-inch glazed pipe	12-inch glazed pipe	12-inch glazed pipe	9-inch glazed pipe (9-inch glazed pipe	9-inch glazed pipe { 12-inch glazed pipe }	9-inch glazed pipe	9-inch glazed pipe	12-inch glazed pipe
LOCATION OF SEWER	From 80 feet east of Michigan st. to Stocking st 9-inch glazed pipe	From 100 feet east of Stocking to N. Jefferson st.	From 200 feet north of Trowbridge street, south . 9-inch glazed pipe	From North Union street to Grand avenue	From Julia street to East Fulton street	From Grand avenue to Union street	From Grand avenue to South East street	From Third street to alley north of West Bridge street, thence west to West Side Ditch	From 100 feet east of South Union to Packard st.	From Jennette street to Alpine avenue	From 58 feet west of Stocking to Fremont street.	From Nagold street south to Fourth street	From Nagold street north to Walker avenue	From Eleventh street to West Leonard street	From 66 feet west of South College ave. west to	F	From 75 feet north of Second street to Fourth st.	From 78 feet south of Eighth st. south to Sixth st.	From West Division street to South Jefferson st	From North avenue to Plainfield avenue
NAME OF STREET	Second street	Second street	Dexter place	Julia street	Grand avenue	East Fulton street	East Fulton street	Lincoln street	Kellogg street	Eleventh street	Nagold street	Fremont street	Fremont street	Scribner street	Thomas street	Turner street	Turner street	Turner street	Sibley street	East Leonard street

Mathewson&Kloote

87.08

2 2

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13

52

9-inch glazed pipe .. |

J. O'Hara J. O'Hara

340.00

80.00

260.00 150.00 GG 900

22

64

24

9-inch glazed pipe ...

From 825 ft. south of E. Bridge st. to Bostwick st. From East Bridge street south 275 feet......

Alley, Block 11 Dexter frac.

and Crescent avenue....

Center street.....

220.00 750.00

70.00

Drieburg & Vetting Collins & O'Hara Wagemacher CONTRACTOR NAME OF L. Schneider Schneider & I. De Bruen J. De Bruen 900.00 . J. De Bruen TABLE SHOWING LOCATION, KIND, SIZE, LENGTH, COST, ETC., OF SEWERS CONSTRUCTED DURING THE YEAR.—CONTINUED. M. Tennis M. Tennis M. Tennis I. Martin J. Owens J. Owens J. Owens I. Owens J. Owens I. Myer 400.00 320 00 1,000.00 410.00 470.00 450.00 520.00 120.00 390 00 2,390.00 F00.00 80.09 \$1,400.00 330.00 . 690.00 TOTAL Cost Гисір'ит'15 Коск Бхсачат'и 16.00 96 30 \$202.00 391.00 136.00 5.00 **80.0**0 contract 63.00 55.00 85.00 76.00 105.00 66.00 36.00 92.40 75.96 CONTRACT \$1,198.00 324.00 325.00 608 00 374.00 164.00 Private 254.04 123 80 197.00 344.00 34.00 00.066,1 507.60 335.00 390.00 895.00 PRICE LENGTH FEET 12.5 145 412 3 5.59 35 3 3 826 3 555 菱 3 Z Ξ 198 -нэт**л** Вляия : : 4 .9 CI m у учног к 21 63 64 * 12-inch glazed pipe (
15-inch glazed pipe (
9 inch glazed pipe (
12-inch glazed pipe (12-inch glazed pipe ... 9-inch glazed pipe ... 12-inch glazed pipe ... 9-inch glazed pipe ... 9-inch glazed pipe . . 9-inch glazed pipe ... 9-inch glazed pipe .. 9-inch glazed pipe .. 9-inch glazed pipe .. 9-inch glazed pipe .. 9-inch glazed pipe ... 9-inch glazed pipe . . 9-inch glazed pipe .. 9-inch glazed pipe ... 9-inch glazed pipe .. 1 9-inch glazed pipe (SIZE AND KIND From 80 feet north of Blakely av. to Wenham av-From Wealthy avenue to Wenham avenue.... From Grand avenue east 225 feet. Watson street..... From Shepard street to West Side Ditch..... From South Ionia street to Burhanan street..... From Jefferson avenue to South Division street .. From 300 feet south of Lawn court to Pleasant st. From 300 feet south of Lawn court to Fifth ave. . From Terrace avenue west to South Lafayette st. From South East street to Packard street...... From near West Bridge street to First street From 400 feet S. of Cherry st. S. to Irving place. From 36 feet south of Tenth avenue north and Stocking street...... From Fourth street to Third street...... From South Prospect street to Waverly place From Fifth avenue to Prescott street...... east to South Ionia street..... From Hodgson place to Irving place...... From Tamarac street to Alpine avenue..... LOCATION OF SEWER West Leonard street South Lafayette street..... Miller street..... Grandville avenue...... Fifth avenue..... Cadwell street and alleys... South Prospect street ... Alley, Block 11 Dexter frac. l'errace avenue..... Cherry street Ninth avenue and Alley NAME OF STREET South Lafayette street. Fountain street Ferrace avenue..... Sycamore street. Sheldon street State street

BRIDGES.

There has been no new bridge work this year.

The replanking of the roadway of the Fulton street bridge, and painting of the Fulton street, Pearl street, Bridge street and Sixth street bridges consists the entire of the work done in this connection.

The cost of the work has been:

For lumber	\$1,255	20
For labor	545	75
For bolts, spikes, etc	107	44
For an additional quantity of paint beyond that noted	•	
in last report	174	96
For oil	35	97
For painting (labor) the bridges	1,016	55
Total	\$3,135	87

PARKS.

LINCOLN PARK.

The work of improving Lincoln Park, commenced last year, was continued into July, when the appropriation for the year was exhausted.

The graveling of all the walks outlined was completed and most of the uneven ground brought up to grade, water mains laid and a sufficient number of hydrants set to admit of the sprinkling of the ground east of the proposed lake.

The cost has been:

For grading and graveling walks	\$1,525 86
For water pipes, hydrants, etc., and laying of same	718 17
Total	\$2,244 03

JOHN BALL PARK.

In compliance with a request of the Common Council for plans for improving the John Ball Park, the Board engaged Mr. H. Haerlin, a landscape gardener of Cincinnati, Ohio, who, after a topographical survey was made, prepared such plans.

The plans embraced about 9,000 feet of drives, small lakelets in a ravine through which runs a small spring brook, two large lakes on the east side of the grounds, at the foot of the bluffs; also located summer house, shelter places, restaurant, music stand, etc.

The expense incurred in this connection has been for surveys \$65.00, and for plans, etc., \$418.60, making the total of expenses incurred \$483.60.

FULTON STREET PARK.

The Council also requested the Board to purchase a fountain for Fulton Street Park, which was done.

The fountain, a combination affair, was purchased of J. W. Fisk of New York, for \$5,200.00. There are three basins, including the ground basin, ranging from 10½ to 40 feet in diameter. The height is 32 feet. In each basin, on bases, are stationed several pieces of statuary, Neptune and lions in the lower one, with Venus surmounting the whole.

The ground basin and fountain foundation is a single piece of concrete masonry. The wall of the basin within the iron coping is brick work in cement mortar, and the whole is lined up with a heavy coat of Portland cement mortar.

This work cost	 \$ 615	20
• Erecting the fountain cost	 167	00
Freight on same	 100	54

For supplying the fountain and sprinkling hydrants in the park 606 feet of pipe was laid, which cost \$503.03.

The total expenditure herein has been \$6,585.77.

HIGHLAND PARK.

In compliance with a request of the Council for plans for improving Highland Park, plans for such improvement were prepared by Mr. Ames, assistant in the office.

The plans embrace about 2,000 feet of gravel walks, summer house, and the utilization of Coldbrook Creek, which passes through the park, in the construction of a lakelet, arrangement of picnic grounds, etc.

There has been no expense incurred in this connection.

WATER MAINS.

Several extensions and some new lines have been laid, and some old lines of Wyckoff pipe removed and iron pipe substituted.

Streets in which mains have been laid are noted in the following table, which shows size of main, etc.:

STREET.	FROM	то	DIAM. INCHES.	LENGTH FEET.	No. of VALVES.	No. or Hyd'nts	REMARKS
Straight	Butterworth	south	-6	780	1	2	New line
Broadway	Webster	north	10	312		1	New line
Allen	Mt. Vernon	east	4	151	 .		New line
Terrace	Fifth	91 ft n Lawn ct.	4	634	1	1	New line
North East	E. Fulton	north	4	437	1	 	New line
Kent	E. Bridge	Trowbridge	6	1161	2	4	Wyckoff removed.
Hastings	Kent	we-t	6	106	1		Wyckoff removed.
West Park	E. Fulton	north	4	170	i	' . • • • • •	New line
Oakland	Wealthy	south	6	360	1	1	New line
North Front	W. Leonard	Webster	б	1826	3	2	New line
West Briage	Marion	west	8	361		1	New line
Fourth	Fremont	N. Lane	6	450	1	: , I	New line
Third avenue	S. Ionia	Buchanan	4	629	1	1	New line
Colfax	N. Coit	Taylor	4	1119	2	2	New line
Reed	Page	Carrier	4	365	i , 1	ا . • • • • • • ،	New line
Shawmut	Summer	Winter	6	286	۱. .	1	Wyckoff removed,
Summer	Shawmut		4	66	1		Wyckoff removed.
Oak	N. Union	Grand Ave	4	605	. 1	1 1	New line
Innes	N. Union	Grand Ave	4	605	1	1	New line
Mt. Vernon	Allen	Valley	4	487		2	New line
Alley between Mt. / Vernon and Court (Shawmut	Allen	4	463	. 1		New line
Webster	Scribner	N. Front	8	266	1	1	New line
Jackson	S. Pine	Marion	4	332	١	1	New line
State	Waverly	S. Prospect	4	846		2	New line
S. Lafayette	Cherry	E. Fulton	4	1245	. 2	2	Wyckoff removed.
Muskegon	Seventh	Ninth	6	657	1	2	New line
Ninth	Muskegon		6	154	1	1	New line.

The total cost of the work has been \$9,819.30.

Miles of mains 67. Number of public hydrants 649. Number of gate valves 514.

RECAPITULATION.

Street improvements \$71,3	330	00
Sewers 22,6	640	00
Bridges	35	87
Parks	13	40
Water mains	319	30
Total \$116,2	38	_ 57
Engineering expenses have been		
For salaries \$4,6	67	14
For transportation, repairs, etc	01	25
For supplies for office	69	00
Total\$4,9	37	 39

Respectfully submitted,

H. A COLLAR,

Engineer.

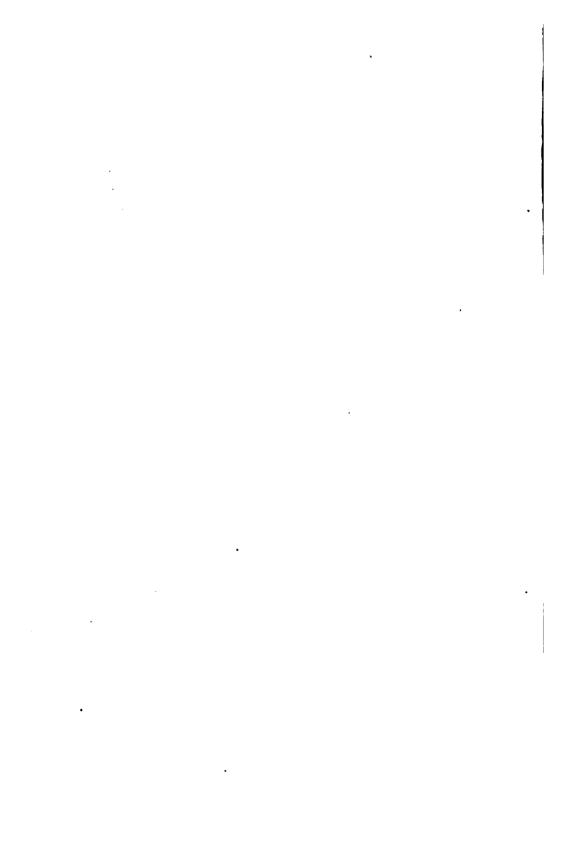
LIST OF SEWERS

IN THE

CITY OF GRAND RAPIDS TO DATE

APRIL 30, 1891

Indicating Size, Length and When Built



STREET.	LOCATION.	Kind.	Size in Inches	Length in Feet.	When Built.
AlmyF	From pt. on west line of Almy street at center of alley between Bartlett and Goodrich streets, thence northeasterly on curve to pt. 14 feet east of west line of said Almy street; thence north to Bartlett street; thence north-easterly on curve to sewer in said Bartlett street.	Gl'zd Pipe	9	173	1883
BankF	From a pt. 40 feet south of East Bridge street, thence southerly to tail race under the canal, at the north line of Squire's alley (so called)	Gl'zd Pipe	12	196	1889
BarclayF	From pt. 200 feet south of Lyon street, south in center of street to Fountain street; thence southwesterly on curve to sewer	Gl'zd Pipe	12	504	1878
BarclayF	From pt. 75 feet south of East Bridge street, south in center of street to Crescent avenue; thence south-westerly on a curve to Crescent avenue sewer	Gl'zd Pipe	9	439	1880
Bartlett F	rom east line of Ellsworth avenue, east in center of street to South Ionia street; thence north-easterly on a curve to sewer in last mentioned street	Gl'zd Pipe	} 12 } !5	556 } 290 {	1875
Blakeley Av F	rom west line of Center street, west in center of street to South Div- ision street; thence north-westerly on a curve to sewer in street last mentioned	Brick	22X33	4 ⁶ 7	78 79
Bostwick F	From pt. 423 feet north of Fountain street, south in center of street to sewer in said Fountain street	Brick	20x24	456	1866
Bostwick F	From centre line of Crescent avenue south, in east gutter of street to Lyon street; thence south-westerly on a curve to the sewer in the last mentioned street	Gl'zd Pipe	9	551	1888
Buckeye ł	From west line of Henry street, west in the center of the street to the west line of South Union street	Brick	16x24	649	83-84

STREET.	LOCATION.	Kind.	Si	ze in iches.	Length in Feet	When Built
BuchananF	rom the north line of Fifth avenue, north in the center of the street to north line of Miller street; thence to north line of Second avenue, at a point 19 feet west of the east line of the street; thence north to the south line of Prescott street; thence north-westerly on a curve to the sewer in said last mentioned street.	Brick	\ 4:	3×56	1576) 387 (80-81
CalderF	rom near center of Island street, north in east gutter of street to sewer in East Fulton street	Brick	():	0x71	30/1	1867
CanalF	rom center of Hastings street at east line of Canal street, northerly on a curve to east gutter of street; thence north to pt. 50 feet north of Hastings street	Brick	20	0 X2 4	89	
CanalF	rom south line of Hastings street, south on a line 22 feet east of the west line of the street to East Bridge street; thence across Canal street on a curve to the east line thereof, at a point 28 feet north of the south line of said East Bridge	Clind	D:		6	-00-
Canal	street	Gizu	r ipe		615	1889
Canal	••••	· · · · · · · · ·				
	rom pt. 50 feet north of Fifth avenue, north in center of street to Pleasant street; thence northwesterly on a curve to sewer in said last mentioned street	Gl'zd	Pipe	12	984	1879
CassF	rom pt. 50 feet north of Pleasant street, north in center of street to Wenham avenue; thence north- westerly on a curve to the sewer in the street last mentioned	Gl'zd l	Pipe	12	935	1879
CassF	rom Morrison street south in cen- ter of the street to Wealthy ave- nue; thence southwesterly on a curve to the sewer in said Wealthy avenue	Gl'zd]	Pipe	12	627	1884
CenterF	rom east line of the street in center of alley south of Blakeley avenue, thence northwesterly on a curve to the center of the street; thence north to Blakeley avenue; thence northwest on a curve to the sewer in the street last mentioned	Brick		x30 x33	50 } 197 }	78 79

STREET.	LOCATION.	Kind.	Size in Inches,	Length in Feet.	When Built.
Center F	From north line of Monson street, north in center of the street to Fifth avenue; thence northwesterly on a curve to the sewer in said Fifth avenue	Gl'zd Pipe	} 9 12	819 } 959 \$	1887
Charles F	from east line of street at point 198 feet north of Buckeye extended easterly; thence southwesterly on curves to the west line of the street at a point 132 feet north of said extended Buckeye street	Brick	14X21	111	83-84
CherryF	From west line of South East street, west in center of street to Packard street; thence northwesterly on a curve to the sewer in said Packard street	Gl'zd Pipe	9	477	1890
CherryF	From a point 60 feet east of South Union street, east in the center of street to Packard street; thence northeasterly on a curve to the sewer in said Packard street	Gl'zd Pipe	9	748	1887
CherryF	From west line of South Union street, west in center of street to Lagrave street; thence northwesterly on a curve to the sewer in said last mentioned street	Gl'zd Pipe	12 15 18 20 22 24 24x36	338 } 325 962 357 } 367 292 305	1874
Cherry F	From west line of South Division street, west in center of street to South Spring street; thence north- westerly on a curve to the sewer in said last mentioned street	Gl'zd Pipe	. 12	318	1871
Clinton E	From south line of Hastings street, south in west gutter of said street to East Bridge street; thence southwesterly on a curve to the sewer in said street last mentioned	Gl'zd Pipe	9	560	1886
Crescent av I	From point 300 feet east of North College avenue, west in center of street to Ransom street; thence southwesterly on a curve to the sewer in the last mentioned street		9 12 15		1884 1880
Crescent av I	From west line of Crescent place, west in center of street to sewer in the alley between Canal and Kent streets		12 15 18	473 (575) 129 (1873
Crescent av I	From point 155 feet east of Bostwick street, west in center of street to Bostwick street; thence south- westerly on a curve to the sewer in said Bostwick street		. 9	193	1890

STREET.	LOCATION.	Kind.	Size in Inches.	Length in Feet.	When Built.
ColdbrookI	From point 200 feet east of Taylor street, west on a line 5 feet south of the center of the street to Grand river	Gl'zd Pipe	12 15 18	570) 279) 273)	187 6
Dexter pl I	From point 200 feet north of Trow- bridge street, south to East Bridge street; thence southwesterly on a curve to the sewer in the street	Gl'zd Pipe	: 9	. 1119	1886
	last mentioned	••	9	266	1890
East Bridge, I	From west line of North College avenue, west in center of street to sewer in alley between Canal and Kent streets Kent elley (as called)	.,	12 15	353) 876 (432)	1885
	Kent streets, Kent alley (so called)	Gl'zd Pipe	16	587	1875
		Brick	18x24 36x48	539 } 110 ∫	1865
East Bridge. I	From east line of Canal street, on a line 28 feet north of the south line of the street, east to Kent alley (so called)	Gl'zd Pipe	. 9	110	1889
E. Leonard . I	From east line of Canal street, west in south gutter of the street to Grand river	Gl'zd Pipe	18	206	1876
E. Leonard . I	From North avenue, west in center of street to Plainfield avenue; thence southwesterly on a curve to the sewer in said street last mentioned	Gl'zd Pipe	9 12 15	598 (1126 (346)	1890
East Fulton.I	From west line of South East street, west on a line 23 feet from south line of street to near west line of South Union street; thence in center of street to South College avenue; thence southwesterly on a curve to sewer in said South College avenue		15 20 16x24 26x39	765 498 70 650	1890 1886
E. Fulton	From west line of North Prospect street, west in the center of the street to West Park Place; thence northwesterly on a curve of said West Park Place at north gutter of Monroe street	11	12 18 20 20x24	472 278 } 528 } 656	1880 1875 1866
E. FultonI	From 75 feet west of South Division street, west in center of street to near Calder street; thence in south gutter west to Grand River		12 18 56x72 60x72	647 482 420 320	1877 1872 1885 66 67
Eighth av.,F	rcm 44 feet east of South Ionia street, west in center of street to S. Division street; thence north- easterly on a curve to sewer in street last mentioned	Gl'zd Pipe	9	600	1889

STREET.	LOCATION.	Kind.	Size in Inches.	Length in Feet.	When Built
ErieF	rom near southeast corner of Canal street and Crescent avenue, north in east gutter of Canal street to north gutter of Crescent avenue; thence northwesterly across Canal street to near south gutter of Erie street; thence west in Erie street				
	to tail race under the canal	Gl'zd Pipe	12	297	1874
FairbanksI	From west line of North Ionia street west in center of street to sewer in Kent alley (so called)	Gl'zd Pipe	9 12		1883
First avF	From 160 feet west of South Divi- sion street, west to Buchanan street; thence northwesterly on a curve to the sewer in said last mentioned street	Gl'zd Pipe	9		1885
Fifth avF	From west line of Terrace avenue, west near center of street to South Lafayette street; thence northwesterly on a curve to the sewer in said street last mentioned	Gl'zd Pipe	9	345	1890
Fifth avI	From west line of Jefferson avenue, west in center of street to Buchanan street; thence northwesterly on a curve to the sewer in said Buchanan street		27X41 31X46 32X42	950 (662 (644)	80-81
Fountain l	From point 200 feet east of North College avenue, west in center of street to Ottawa street		12 18 24x36 24x30	1154 (1234) 589 786	1876 1874 1867
Fountain!	From 225 feet east of Grand avenue, west in center of street to said avenue; thence southwesterly on a curve to the sewer in said Grand avenue		. 12	263	1890
Fcuntainl	From 185 feet west of North Union street, east in center of street to said North Union street; thence southeasterly on a curve to the sewer in said street last mentioned. Also from point 319 feet east of said North Union street, west in center of street to said North Union street; thence southwesterly on a curve to the sewer in said last mentioned street	• Gl'zd Pipe	9	592	1886
Fourth avI	From 50 feet west of South Division street, west in center of street to Buchanan street; thence north- westerly on a curve to sewer in				
	said Buchanan street	Gl'zd : Pipe	9	1236	1888

STREET.	LOCATION.	Kind.	Size in Inches.	Length When in Feet. Built.
GoodrichI	From east line of Ellsworth avenue, east in center of street to South Ionia street; thence northeasterly on a curve to the sewer in the street last mentioned		12 15	551 / 1875 290 (
Goodrich	From 65 feet west of South Division street, west in center of street to South Ionia street; thence north- westerly on a curve to the sewer in said last mentioned street	Gl'zd Pipe	9	558 1881
	From Ellsworth avenue, southerly in center of street to Prescott street sewer	Gl'zd Pipe	12	1391 1883
Grandville I avenue	From north line of Fifth avenue, northerly in center of street to Prescott street sewer	Gl'zd Pipe	12 15	1742) 367 (1890
Grand av F	From south line of Julia street, south near center of street to East Fulton street; thence southwesterly on a curve to the sewer in the last mentioned street		12 15 20	333 267 540
Hastings I	From east line of North Ionia street, west in center of street to sewer in Kent alley (so called); and from thence west to Canal street.	Brick	20X24	865 1867
Henry I	From east side of street at a point 132 feet north of Buckeye street extended easterly, thence southwesterly on a curve to center of street; thence south in center of street to north line of Buckeye street; thence southwesterly on a curve to connect with sewer in said last mentioned street		16x2 4	210 83-84
HolbrookF	rom west line of South East street, west in center of street to Packard street; thence northwesterly on a curve to the sewer in said Packard street	Gl'zd Pipe	9	469 1888
IslandF	From southwest corner of Island and Sheldon streets, westerly to center of street at South Spring street; thence west to Calder street	Brick	36x48 60x72	955 67-68 510 (
Irving place . F	rom east line of South Prospect street opposite south line of Irving place, thence to west line of said South Prospect street at center of Irving place; thence west in center of street to South Lafayette street; thence southwesterly on a curve			
	to the sewer in said street last mentioned	Brick	16x24 18x27	366 59 83-84

STREET.	LOCATION.	Kind.	Size in Inches.	Length in Feet.	When Built.
Jefferson av . I	From south line of East Fulton street, south in center of street to near the north line of Washington street		20 x 24	548	1866
Jefferson av I	From 50 feet south of Oakes street, south in center of street to Cherry street; thence southwesterly on a curve to the sewer in said Cherry street		12	405	1875
Jefferson av I	From north line of Morrison street, north in center of street to Cherry				
	street; thence northwesterly on a curve to the sewer in said last mentioned street		9 12		1883
Jefferson av I	From 18 feet south of Morrison street, south in center of street to Wealthy avenue; thence south- westerly on a curve to the sewer in said Wealthy avenue		12	600	1883
Jefferson av I	From 150 feet north of Blakeley avenue, north in center of street to sewer in Wealthy avenue		18x18	850	1867
Jefferson avl	From north line of Hall street, north in center of street to Fifth avenue; thence northwesterly on a curve to the sewer in said Fifth avenue.		9 12 15		1889
JuliaF	From center of North Union street, east in center of street to Grand avenue; thence southeasterly on a curve to the sewer in said Grand avenue	Gl'zd Pipe	9	573	1890
Kellogg I	From 100 feet east of South Union street, east in center of street to Packard street; thence northeasterly on a curve to the sewer in said last mentioned street	Gl'zd Pipe	9	716	1890
KentF	From south line of Mason street, south in center of street to New- berry street; thence southwest- erly on a curve to the sewer in	Clind Dina		9	-9
Kent F	rom east line of street at center of alley in rear of Court House, northwesterly on a curve to east gutter of street; thence north to Crescent avenue; thence northwesterly on a curve to sewer in said Crescent avenue at west line of				
	street	Gi za 11pe	12	220	1888

STREET.	LOCATION.	Kind.	Size in Inches.	Length in Feet.	When Built.
Lagrave I	From west line of street at center of Maple street, northeasterly on a curve to the center of the street; thence north to sewer between Island and Oakes extending east and west across private property.				
Lagrave I	From south line of Wealthy avenue, south in center of street to Wenham avenue; thence southwesterly on a curve to the sewer in said last mentioned avenue		12	561	1880
Lake avl	From west line of South East street, northwesterly in center of street to sewer in East Fulton street			554 930	1889 1887
Logan I	From west line of South College ave- nue, west in center of street to South Lafayette street; thence northwesterly on a curve to sewer in said South Lafayette street		9 12 12	1014 } 296 { 48	1885
LyonI	From west line Campbell Place, west in center of street to culvert or tail race	Gl'zd Pipe	24x30 20x30 24x36 36x48 15 12	472 412 { 400 { 428 }	67-68 1884
			12 9		1885
Madison avl	From 150 feet south of Cherry street, south to connect with sewer across private grounds (extension of Wealthy avenue sewer)	Gl'zd Pipe	9	705	1885
Madison av	From 75 feet north of State street, north in center of street to Washington street; thence northwesterly on a curve to sewer in said Washington street	Gl'zd Pipe	9	532	1882
Madison av	From 50 feet north of Fifth avenue, north in center of street to Pleasant street; thence northwesterly on a curve to sewer in said Pleasant street	Gl'zd Pipe	9 12	608 <u>}</u> 387 (1888
Maple F	From 25 feet east of Sheldon street, east in center of street to Lagrave street	Gl'zd Pipe	12	243	1873
MillsF	From west line of South Union street, west in center of street to Madison avenue; thence south- west across said Madison avenue to west line at center of Pleasant				
	street	Brick :	28x42	1333	78-79

STREET.	LOCATION.	Kind.		Length in Feet.	
Miller F	From west line of South Ionia street, west in center of street to Bu- chanan street; thence northwest- erly on a curve to the sewer in				
	said street last mentioned	Gl'zd Pipe	9	633	1890
MonroeF	From west line West Park place, westerly in northerly gutter of street to sewer in Pearl street		20		1875 1876 1869
Morris avF	From north line Wealthy avenue, north in center of street to sewer across private property (extension of Wealthy avenue sewer)	Gl'zd Pipe	12	421	1887
Morris avF	from east line of street at point 500 feet north of Wealthy avenue, thence southwesterly on a curve to the center of the street; thence south 'and southwesterly on a curve to the west side of the street at a point 400 feet north of said Wealthy avenue	Brick	16x24	137	83-84
NewberryF	From west line of North Ionia street, west in center of street to near alley between Canal and Kent streets (Kent alley, so called); thence southwesterly on a curve to the sewer in said alley		36x48 28x42	260 404	63 -64 80-81
Ninth avF	From point 116 feet west of South Ionia street, east to South Division street; thence northeasterly on a curve to the sewer in South Division street	Gl'zd Pipe	9 9	644 182	1888 1890
N. Division	From 50 feet south of East Bridge street, south in east gutter of street to Crescent avenue; thence south- westerly on a curve to sewer in said Crescent avenue	Gl'zd Pipe	9	531	1882
N. Division	From 40 feet south of Crescent avenue, south in center of street to Lyon street; thence southwesterly on a curve to sewer in said street last mentioned	Gl'zd Pipe	12	498	1874
N. Division	From north line of Pearl street, north in center of street to Lyon street; thence northwesterly on a curve to sewer in said Lyon street	Gl'zd Pipe	12	318	1874
N. DivisionI	From south line of Pearl street, south in center of street to Fountain street; thence southwesterly on a curve to the sewer in said last mentioned street	Gl'zd Pipe	12	321	1874

STREET.	LOCATION.	Kind.	Size in Inches.	Length in Feet.	When Built
N. Division	From 40 feet north of Monroe street north in center of street to Fountain street; thence northwesterly on a curve to the sewer in the street last mentioned	Gl'zd Pipe	12 15		1874
N. Ionia	From angle north of Monroe street, north in center of street to Fountain street; thence northwesterly on a curve to the sewer in said Fountain street.	Gl'zd Pipe	9	250	1887
N. Ionia	From north line Fountain street, north in east gutter of street to Lyon street	Wood	24x30	583	1863
N. Ionia	From 75 feet south of Crescent avenue, south in center of street to Lyon street; thence southwesterly on a curve to sewer in said Lyon street	Gl'zd Pipe	12	463	1879
N. Ionia	From 100 south of East Bridge street, south in center of street to Crescent avenue; thence south- westerly on a curve to the sewer in said Crescent avenue	Gl'zd Pipe	12	476	1879
N. Ionia	From north line of Newberry street, north in east gutter of street to Mason street; thence to center of street at north line of Mason street; thence north to Walbridge street; thence northwesterly on curves to connect with sewer in said last mentioned street 110 feet west of North Ionia street	Gl'zd Pipe	9	566) 802 §	1889
N. Ionia	From east line of street opposite school house, thence north-west-erly on curve to west gutter of street; thence north to Coldbrook street; thence north-westerly on a curve to sewer in said Coldbrook street	Gl'zd Pipe	9	382	1889
N. Ionia	From 75 feet south of Monroe street, southerly in center of street to East Fulton street; thence south- westerly on a curve to the sewer in said last mentioned street	Gl'zd Pipe	15	500	1872
N. Ionial	From 25 feet south of south line of Hastings street, thence south in east gutter of street to East Bridge street; thence southwesterly on a curve to sewer in said East Bridge street	Gl'zd Pipe	9	537	1887
		-	-	-	•

STREET.	LOCATION.	Kind.	Size in Inches.	Length in Feet.	When Built
N. CollegeF	rom 200 feet north of Fountain street, north in center of street to Lyon street; thence northwesterly on a curve to the sewer in said Lyon street	Gl'zd Pipe	9	577	1886
N. College F	rom 100 feet south of Fountain street, south in center of street to sewer in East Fulton street	Gl'zd Pipe	9	708	1887
N. Prospect.F	rom 150 feet south of Fountain street, south in center of street to East Fulton street; thence south- westerly on a curve to the sewer in said last mentioned street	Gl'zd Pipe	• 9	657	1880
N. Prospect.F	rom 50 feet north of Crescent avenue, north in center of street to East Bridge street; thence northwesterly on a curve to the sewer in said East Bridge street	Gl'zd Pipe	9	413	1887
N. UnionF	rom south line of Fountain street, south in center of street to East Fulton street; thence southwesterly on a curve to the sewer in said last mentioned street	Gl'zd Pipe	9	806	1886
N. Lafayette.F	From 86 feet north of Crescent avenue, north to East Bridge street; thence northwesterly on a curve to the sewer in said street last mentioned	Gl'zd Pipe	9	400	1889
N. Waterloo.F	rom 80 feet southerly from Monroe street, southerly in center of street to East Fulton street; thence southwesterly on a curve to sewer in said East Fulton street	Gl'zd Pipe	18	960	72-73
Oakes F	rom center South Spring street at south line of street, thence northwesterly on a curve to the center of said street at the west line of said South Spring street; thence west in center of street to near alley between said South Spring and South Ionia streets; thence northwesterly on a curve to the north line of the street at center of the alley	Brick	48 x60	181	1869
Ottawa F	rom east line of Ottawa street in center of Fountain street, thence south-westerly on curves to sewer in Monroe street	Brick	24×36	111	1874
Ottawa F	rom 100 feet south of Monroe street, southerly in center of street to connect with sewer in East Fulton street	Brick	16x24	792	1870

STREET.	LOCATION.	Kind.	Size in Inches.	Length in Feet.	When Built.
Ottawa F	From 100 feet south of Coldbrook street, south in center of street to Newberry street; thence south- westerly on a curve to sewer in said Newberry street		12 24×36 20×30	632 (552) 716)	80-81
OttawaE	From 25 feet north of East Bridge street, north in east gutter of street to Hastings street; thence northwesterly on a curve to sewer in said Hastings street	Gl'zd Pipe	9	5 2 7	1883
OttawaE	From 40 feet north of Hastings street, north in east gutter of street to Trowbridge street; thence northwesterly on a curve to the sewer in said Trowbridge street	Gl'zd Pipe	9	507	1883
OttawaF	From 27 feet north of Trowbridge street, north in center of street to Fairbanks street; thence north- westerly on a curve to the sewer in said last mentioned street	Gl'zd Pipe	9	5 2 7	1883
OttawaF	From 25 feet north of Fairbanks street, north in center of street to Newberry street; thence northwesterly on a curve to sewer in said street last mentioned	Gl'zd Pipe	9	520	1883
OttawaF	From east line of street opposite west entrance to City Hall, southwesterly on curve to center of street; thence south to Lyon street; thence southwesterly on a curve to sewer in said Lyon street	Gl'zd Pine	12	158	1885
Packardl	From north line of Cherry street, north in center of street to Lake avenue; thence northwesterly on a curve to sewer in said Lake avenue			788	1887
Paris AveF	From 127 feet south of Wealthy avenue, south in center of street to Mills street; thence southwesterly on a curve to the sewer in Mills street		9 12	529 <u>{</u>	1888
Paris AveI	from east line of street at point 603 feet north of Wealthy avenue, southwesterly on a curve to center of street; thence south in center and southwesterly on a curve to the west line of the street to a point 496.5 feet north of said Wealthy avenue (extension of	Dariel.			9- 0
	Wealthy avenue sewer)	BLICK	14×21	141	83-84

STREET.	LOCATION.	Kind.	Size in Inches.	Length in Feet.	When Built
Park	From east line of East Park Place, west in center of street to North Division street; thence northwesterly on a curve to the sewer in said last mentioned street	Gl'zd Pipe	9 12	330 } 248 }	1884
PearlF	From east gutter of North Division street, west in center of street to Canal street, westerly across said street to west line at south gutter of said Pearl street; thence west to Island addition sewer	••	16x24 16x24 36x48 48x60		1874 1870 1869 1870
Perry	From north line of Madison street, north in west gutter of street to Quimby street sewer	Wood	24×24	396	1883
Plainfield av. I	From south line of Carrier street, southwesterly in center of street to Coldbrook creek	Gl'zd Pipe	15	327 } 367 }	1878
Plainfield av. I	From 75 feet south of Coldbrook creek, southwesterly in center of street to sewer in Taylor street		12	320	1878
Pleasant F	From west line of Madison avenue, west in center of street to near alley between Center street and Jefferson avenue; thence north- westerly on a curve to center of said alley at north line of street		16x24 18x27 20x30 24x36	300 } 223 }	78-79 1887
Prescott	From west line of South Division street, west in center of street to South Ionia street to the sewer in said last mentioned street	Brick	36x54	694	78-79
PrescottI	From 50 feet west of South Ionia street, west in center of street to Grandville avenue (west line)	Gl'zd Pipe	12 55 x 71	603 831	1880 1880
Prospect plI	From 150 feet south of Hastings street, south in center of street to East Bridge street; thence southwesterly on a curue to the sewer in said East Bridge street		9	506	. 1889
QuimbyI	From west line of Perry street, west in center of street to Taylor street; thence southwesterly on a curve to the sewer in east gutter of said last mentioned street		12	1458	1888
RansomI	From south line of Fountain street, south in center of street to East Fulton street; thence southwesterly on a curve to the sewer in said street last mentioned	Brick "	20X24 20X24		1866 1875

STREET.	LOCATION.	Kind.	Size in Inches.	Length in Feet.	When Built.
RansomI	From 200 feet south of Lyon street, south in center of street to Fountain street; thence south-westerly on a curve to the sewer in said Fountain street		9	495	1884
Ransoml	From south line of Crescent avenue, south in center of street to Lyon street; thence south-westerly on a curve to the sewer in said last mentioned street	Gl'zd Pipe	15	537	1880
Second av I	From 100 feet west of South Division street, west in center of street to Buchanan street; thence northwesterly on a curve to the sewer in said Buchanan street	Gl'zd Pipe		1107 } 189 \$	1883
Seventh avF	from 50 feet east of South Ionia street, east in center of street to South Division street; thence north-easterly on a curve to the sewer in said street last mentioned	Gl'zd Pipe	9	595	1888
ShermanF	From South East street, west in center of street to South Union street; thence south-westerly on a curve to the sewer in said last mentioned street	Brick	22x33 26x39	658 <u>}</u> 641 §	1887
SheldonF	From 80 feet north of Blakeley avenue, north in center of street to Wenham avenue; thence northwesterly on a curve to the sewer in said Wenham avenue	Gl'zd Pipe	9	365	1890
Sheldon F	From south line of Wealthy avenue, south in center of street to Wenham avenue; thence south-westerly on a curve to sewer in said last mentioned street	Gl'zd Pipe	9 12	275 <u>}</u> 286 ∫	1889
Sheldon F	From 150 feet south of Island street at east line of street, thence north- westerly to near south-west corner of said street and Island street	Brick	36 x 48	172	67-68
S. CollegeF	rom East Fulton street, south in center of street 250 feet; thence southwesterly on a curve to the sewer across private grounds (ex- tension of Washington st. sewer).	Brick	24x36	278	1886
S. IoniaF	from 50 feet south of East Fulton street, south in center of street to Island street; thence southwest- erly on a curve to the sewer in said Island street	Gl'zd Pipe	9	298	1880

STREET.	LOCATION.	Kind.	Size in Inches	Length in Feet.	When Built.
S. IoniaF	rom center line of Prescott street at east line of South Ionia street, thence northwesterly to center of the street; thence north in center of street to Williams street; thence northeasterly on a curve to sewer in said last mentioned street	Brick	40x60 40x60		1875
S. IoniaF	rom 15 feet south of Seventh avenue, south in center of street to Ninth avenue; thence southeasterly on a curve to sewer in said street last mentioned		9	627	1888
S. Prospect F	From 37 feet north of State street, north in center of street to Washington street; thence northwesterly on a curve to the sewer in said Washington street	Gl'zd Pipe	12	430	1875
S. Prospect F	From 190 feet south of East Fulton street, south in center of street to Washington street; thence south- westerly in curve to sewer in said street last mentioned	Gl'zd Pipe	9	447	1889
S. Prospect F	From 400 feet south of Cherry street, south in center of street to Irving place; thence southwest- erly on a curve to sewer in street last mentioned	Gl'zd Pipe	9	486	1890
S. DivisionF	rom 25 feet north of Green street, north in center of street to Fifth avenue; thence northwesterly on a curve to the sewer in said Fifth avenue	٠	9 12 16x24 18x27	677 655 645	1883
S. DivisionF	From Fifth avenue, north in center of street to Prescott street; thence northwesterly on a curve to the sewer in said last mentioned street		18 18 22x33	1564 45 { 350 }	1871 1878
S. DivisionF	rom Wealthy avenue, south in center of street to Prescott street; thence southwesterly on a curve to the sewer in said Prescott street	Brick	30x45 26x39		1876 1882
S. DivisionF	rom 25 feet north of Wealthy avenue, north in center of street to Cherry street; thence northwesterly on a curve to sewer in said Cherry street	Gl'zd Pipe	12 12		1871 1878
S. DivisionF	rom 25 feet north of Cherry street, north in center of street to Island street; thense northwesterly on a curve to the sewer in said Island street	Gl'zd Pipe	15	869	1872

STREET.	LOCATION.	Kind.	Size in Inches.	Length in Feet.	When Built
S. Lafayette. F	rom 50 feet south of East Fulton street, south in the center of the street to Washington street; thence southwesterly on a curve to the sewer in said street last mentioned	Brick	18x24	579	1868
S. Lafayette. F	From 75 feet north of Hodgson place (so called), north in center of street to Cherry street; thence north- westerly on a curve to the sewer in said last mentioned street	Gl'zd Pipe	9	324	1882
S. Lafayette. F	from north line of Hodgson place (so called), south in center of street to Wealthy avenue; thence southwesterly on a curve to the sewer in said Wealthy avenue		9 28x42	546 410	1890 83-84
S. Lafayette. F	From Wealthy avenue, sonth in center of street to Wenham avenue; thence southwesterly on a curve to the sewer in said last mentioned street	Gl'zd Pipe	9	561	1890
S. Lafayette. F	rom east line of street at center of Pleasant street, northwesterly on a curve to the center of the street; thence north in center of street to Wenham avenue; thence northwesterly on a curve to the sewer in said Wenham avenue	Brick	16 x2 4 18 x2 7	-	1877 1887
S. Lafayette. F	From Fifth avenue, north in center of street to Pleasant street; thence northwesterly on a curve to the sewer in Pleasant street	Gl'zd Pipe	·	612 } 429 \$	1888
S. Spring F	rom center of Bartlett street, north in center of street to Oakes street, to the sewer in said last mentioned street.	Brick	20x30 48x60	333 } 781 \$	1869
S. Spring F	rom 30 feet north of Wealthy avenue, north in center of street to Goodrich street; thence northwesterly on a curve to the sewer in said street last mentioned	Gl'zd Pipe	9	299	1883
S. UnionF	from 165 feet north of Cherry street, north in center of street to East Fulton street; thence north- westerly on a curve to the sewer in said street last mentioned	Gl'zd Pipe	9	808 283	1886 1888
S. UnionF	from south line of Sherman street, south in center of street to Mills street; thence southwesterly on a curve to the sewer in said street last mentioned	Brick		·196	1887

STREET.	LOCATION.	Kind.	Size in Inches.	Length in Feet.	When Built
S. Waterloo.F	From 77 feet southerly from Island street, northerly to East Fulton street; thence northerly on a curve to the sewer in the street last mentioned		12	530	1889
StateF	From South Prospect street, westerly 22 feet from south line of street to sewer in Waverly place	•		826	1890
Sycamore F	From center of Jefferson avenue, west in center of street to South Division street; thence northwesterly on a curve to the sewer in last mentioned street	Gl'zd Pipe	9 12	524 } 412 }	1890
TaylorF	From 20 feet north of south line of Quimby street, south in east gutter of street to Howland street; thence across street to open ditch; also, from 12 feet from north of north line of East Leonard street, north in east gutter of street to Howland	Cement Pir	De 9	513 } 1150 }	1872
Terrace avF	rom north line Lawn court, north in center of street to Pleasant street; thence northwesterly on a curve to the sewer in said last mentioned ttreet	Gl'zd Pipe			1890
Terrace avF	rom south line of Lawn court, south in center of street to Fifth avenue; thence southwesterly on a curve to the sewer in said Fifth avenue	Gl'zd Pipe	9	522	1890
Third avF	rom 200 feet west of South Division street, west in center of street to Buchanan street; thence north- westerly on a curve to the sewer in said street last mentioned	Gl'zd Pipe	· 9	401 } 641 }	1889
Third avF	from easterly line of Grandville avenue, easterly in center of street to Buchanan street; thence northeasterly to sewer in said Buchanan street	Gl'zd Pipe	9 12	250 } 947 \$	1885
ThomasF	rom 66 feet west of South College avenue, west in center of street to Madison avenue; thence north- westerly on a curve to the sewer in said Madison avenue	Gl'zd Pipe	9	575	1890
Trowbridge .F	rom west line of North Ionia street, west in center of street to near alley between Canal and Kent streets (Kent alley, so called); thence southwesterly on a curve to the sewer in said alley		9 12 16x24	220) 284 } 183 }	• 1883

STREET.	LOCATION.	Kind.	Size in Inches.	Length in Feet.	When Built
Waverly pl	From Cherry street, north in center of street to State street; thence northwesterly to the sewer in Washington street		24 x3 0	723	1869
Walbridge !	From the east line of north Ionia street, west in center of street to Ottawa street; thence southwesterly on a curve to the sewer in said last mentioned street		20 x 30	301	1871
Washington.	From South College avenue, west in center of street to Jefferson ave-				
	nue; thence westerly to the west line of the last mentioned street at a point —— feet north of north line of said Washington street	Gl'zd Pipe Brick	12 24x30 36x48	660 1283 } 90 {	1879 68-69
Wealthy av	From west line of South East street, west in center of street to Morris avenue; thence northwesterly on a curve to the sewer in said Morris avenue.	Gl'zd Pipe	e 9 12	1589 } 640 {	1887
Wealthy av	From west line South Lafayette street, west in center of street to South Division street; thence southwesterly on a curve to the sewer in said street last mentioned	Brick	20x30 26x39		83-84 1882
Wenham av.	From South Lafayette street, west in center of street to South Division street; thence southwesterly on a curve to the sewer in said last mentioned street	Brick	16x24 18x27 30x45	300 } 947 310 }	1876
Williams	From 153 feet east of Ellsworth avenue, east in center of street to South Spring street; thence northeasterly on a curve to the sewer in said South Spring street.	: : : Gl'zd Pipe	12 48x60	705 275	1880 1875
Wealthy av. sewer exten- sion across private property	From west line South East street at a point 198 feet north of Buckeye street produced east, west to Charles street	: •	14x21	264	83-84
Wealthy av. sewer exten- sion across private property	From west line of Charles street at point 132 feet north of Buckeye street produced east, west to Henry street	;)	16x2 4	264	83-84
Wealthy av sewer extension across private property	From west line South Union street opposite center of Buckeye street, west to Paris avenue at a point 603 feet north of Wealthy avenue		16 x2 4	276	83-84

STREET.	LOCATION.	Kind.	Size in Inches.	Length in Feet.	
Wealthy av. sewer exten- sion across private property	From west line Paris avenue, at a point 496.5 feet north of Wealthy avenue, west to South College avenue, at a point 482 feet north of said Wealthy avenue; thence across said South College avenue to a point 500 feet north of said Wealthy avenue; thence west parallel with said last mentioned street to Morris avenue	Brick ''	14×21 16×24	334 } 264 }	83-84
Wealthy av. sewer exten- sion across private property	From west line of Morris avenue, at point 400 feet north of Wealthy avenue, thence west parallel with said street last mentioned to Welton alley (so called), now vacated; thence southwesterly and west to South Prospect street, at a point opposite south line of Irving place	Brick	18 x2 7	600	83-84
Washington street sewer extension across private property	From west line of South College avenue, at point 312 feet uorth of Washington street, thence on curves westerly to point 112 feet west of said South College avenue, and 245 feet north of Washington street; thence west parallel with said last mentioned street to east line of block 1 of L. Campau's Second Addition; thence southwesterly on curves to point 66 feet west of last described point and 150 feet north of said Washington street; thence westerly to a point 125 feet north of said last mentioned street and 33 feet east of the center of Madison avenue produced northerly; thence southwesterly on a curve to said produced street line; thence south to said Washington street; thence southwesterly on a curve to the sewer in said Washington street.	Brick	18x27	882	1884
Flushing sewer	From a river connection at a point 38 feet west of east line of Canal street and 80 feet north of Newberry street, south in Canal street to said Newberry street; thence southeasterly on a curve to center of last mentioned street; thence east and southerly on a curve to connect with sewer in alley between Canal and Kent streets	Gl'zd Pipe	e 15	244	1884

STREET.	LOCATION.	Kind.	Size in Inches.	Length in Feet.	When Built.
Intercepting sewer	From sewer in Pearl street, north in. Canal street 25 feet west of east line of street to Lyon street; thence northwesterly to west line of street on a curve to a point 27 feet south of north line of Lyon				
	street; thence west to Grand river; thence in river to deep water channel	**	18 24 16	350 } 491 350 }	1884
	From end of east Fulton street sewer, westerly to deep water in river	Iron	16	350	
Intercepting sewer	From end of Coldbrook street sewer, westerly to deep water in river	Iron	8	144	
East channel or Island Company's sewer	From south line of Pearl street,—feet west of Canal street, southerly to a point 39 feet south of Grand Rapids & Indiana Railroad tracks		74×124 54×84	358 370	1872 1885
Prescott st. sewer exten- sion across private grounds	From west line of Grandville avenue, opposite Prescott street, westerly on private grounds, to the open ditch or creek on the Gas Company's grounds	Wood	48 x48	650	8o-81
	From 150 feet south of Island in alley between South Ionia and South Spring streets, northwesterly across private grounds to sewer in Island street	Brick	48 x 60	248	1869
	From 150 feet south of Island street, on west line of Jefferson avenue, westerly to Sheldon street	Brick	36x48	591	67-68
Alley be- tween Canal and Kent (Kent alley, so called)	From south line Newberry street, south to sewer in Lyon street	Brick	36x48 37x48 32x48 28x42	678 528) 1679 } 574 }	1865 80–81
Alley be- tween Canal and Ottawa	From north line of Walbridge street, south to south line of Mason street	Gl'zd Pipe	9 12	787	1874
Alley be- tween Kent and Ottawa	From Trowbridge street, south to sewer in Hastings street	Gl'zd Pipe	9 12	543	1872
Alley be- tween Kent and Ottawa	From 75 feet north of East Bridge street, north to sewer in Hastings street	Gl'zd Pipe	9	467	1880
Alley be- tween Kent and Ottawa	From 75 feet south of East Bridge street, south to sewer in Crescent avenue	Wood	18x24	482	••••

STREET.	LOCATION.	Kind.	Size in Inches.	Length in Feet.	When Builat
Alley be- tween Kent and Ottawa	From 75 feet north of Lyon street, north to east and west alley in rear of Court House; thence northwesterly on a curve into said east and west alley; thence west to Kent street	Gl'zd Pipe	12 12	240 125	1873 1888
Alley be- tween Ottawa and North Ionia	From 50 feet north of Hastings street, north to Trowbridge street sewer	Gl'zd Pipe	9	488	1884
Alley be- tween Ottawa and North Ionia	From Fairbanks street, north to sewer in Newberry street	Gl'zd Pipe	. 9	550	1889
Alley be- tween Ottawa and North Ionia	From 50 feet south of East Bridge street, south to sewer in Crescent	Gl'zd Pipe	9	520	1882
Alley be- tween Ottawa and North Ionia	From east and west alley rear of City Hall, north to sewer in Crescent avenue	Gl'zd Pipe	9	345	1882
Alley be- tween Ottawa and North Ionia	From 25 feet south of Hastings street, south to sewer in East Bridge street	Gl'zd Pipe	9	529	1887
Alley be- tween North Division and Bostwick	From south line of Crescent avenue, south to sewer in Lyon street	Cement Pip	e 12	526	1871
Alley be- tween Bost- wick and Ransom sts.	From 275 feet south of East Bridge street, north to sewer in said street	Gl'zd Pipe	9	352	1890
Alley be- tween Bost- wick and Ransom sts.	From 325 feet south of East Bridge street, south to sewer in Crescent avenue	Gl'zd Pipe	9	227	1890
Alley be- tween Clinton and Livingston	From Fairbanks street, south to sewer in East Bridge street	Gl'zd Pipe	9 9	1172 566	1886 1889
Alley between	en Coit and Livingston. (See Dexter	place.)			
Alley be- tween Coit and Clancy	From Trowbridge street, south to sewer in East Bridge street	Gl'zd Pipe	9	1188	1888
Alley be- tween North Lafayette and North Prospec	From 240 feet north of Lyon street, south to sewer in said Lyon street	Gl'zd Pipe	9	279	1886
Alley be- tween North Lafayette and North Prospec	From 97 feet south of Lyon street, south to sewer in Fountain street.	Gl'zd Pipe	12	640	1879

STREET.	LOCATION.	Kind.	Size in Inches.	Length in Feet.	When Built.
Alley be- tween Ells- worth avenue and Calder st.	From north line of Cherry street, north to sewer in East Fulton street	Gl'zd Pipe	12 9	797 465	1874 1888
Alley be- tween Almy and Calder	From 40 feet north of Cherry street, north to sewer in Island street	Gl'zd Pipe	9 12	432) 438 \$	1873
Alley be- tween Almy st. and Ells- worth av.	From 35 feet south of Bartlett street, south to sewer in east and west alley in the block	Gl'zd Pipe	9	108	1883
Alley be- tween Almy st. and Ells- worth av.	From 35 feet north of Goodrich street, north to sewer in east and west alley in block	Gl'zd Pipe	9	108	1883
Alley be- tween Almy st. and Ells- worth av.	From north and south alley in block, east to Almy street	Gl'zd Pipe	9	351	1883
Alley be- tween Ells- worth av. and S. Waterloo st.	From Oakes street, north to alley south of Island street; thence west to South Waterloo street sewer		9	36 ₇	1889
Alley be- tween South Ionia and South Spring	From 50 feet north of Cherry street, north to a point 150 feet south of Island street		9 48x60	422 250	1880 1869
Alley be- tween South Division and South Spring	From 50 feet south of East Fulton street, south to sewer in Island street	Gl'zd Pipe	9	274	1873
Alley be- tween South Division and South Spring	From Oakes street, north to sewer in Island street	Gl'zd Pipe	9	442	1883
Alley be- tween South Division and South Spring	From 50 feet north of Wealthy avenue, north to sewer in Goodrich street	Gl'zd Pipe	9	228	1886
Alley be- tween South Division and South Spring	From Bartlett street, south to sewer in Goodrich street	Gl'z8 Pipe	9	525	1883
Alley be- tween Sheldon and Lagrave	From 60 feet south of Maple street, south to sewer in Wealthy avenue	Gl'zd Pipe	12 9	350 427	1874 1883
Alley be- tween Jeffer- son av. and Lagrave street	From Goodrich street, south to sewer in Wealthy avenue	Gl'zd Pipe	9	374	1883
Alley be- tween Jeffer- son av. and Lagrave street	From 38 feet north of Wenham avenue, north to sewer in Wealthy avenue	Gl'zd Pipe	9	512	1887

STREET.	LOCATION.	Kind.	Size in Inches.	Length in Feet	When Built
Alley be- tween Center, Jefferson av., Pleasant and Blakeley sts.	From Pleasant street, north to east and west alley; thence west to sewer in Center street		20x30	554	78-79
Alley be- tween Cass street and Jefferson av.	From 50 feet north of Wenham, north to sewer in Wealthy avenue	Gl'zd Pipe	9	503	1884
Alley be- tween Cass street and Jefferson av.	From 50 feet south of Blakeley avenue, south to sewer in Pleasant street	Gl'zd Pipe	9	462	1886
Alley be- tween Madi- son and South Prospect (Wel- ton alley, so called)		Gl'zd Pipe	9	328	1884
Alley be- tween James and Henry	From 50 feet north of east and west alley north of Wealthy avenue, north to sewer in Buckeye street.	Gl'zd Pipe	9	433	1888
Alley west of South Ionia	From 30 feet north of Tenth avenue, north to Ninth avenue sewer	Gl'zd Pipe	9	272	1890
Center	From 40 feet north of Sycamore, north to sewer in said street at a point 33 feet north of center line of east and west alley, south of Blakeley avenue	Gl'zd Pipe	9 12	490 } 385 }	1891
	WEST SIDE SEWE	RAGE.			
Alabama	From point 50 feet south of Third street, south in center of street to West Bridge street; thence south-easterly on a curve to the sewer in said last mentioned street	Gl'zd Pipe	9 12	684) 410 }	1884
Allen	From west line of Winter street, east in center of street to near east line of South Front street, at tail race under West Side canal		18 72	1194 24	1872 1876
Alpine av	From North street, south in center of street to West Leonard street; thence southeasterly on a curve to the sewer in said street last mentioned		12 16x24 18x27 20x30	515 805 658 647	1883
Alpine av	From Twelfth street, north in center of street to West Leonard street; thence northeasterly on a curve to the sewer in said West Leonard street	Gl'zd Pipe	12	663	1888

STREET.	LOCATION.	Kind.	Size in Inches.	Length in Feet.	When Built,
Alpine av, F	From 50 feet south of Twelfth street, south in center of street to Eleventh street; thence south- easterly on a curve to the sewer in said last mentioned street		9	593	1888
Alpine avF	from south line of Eleventh street, south in center of street to Seventh street; thence southeasterly on a curve to the sewer in said Seventh street	Gl'zd Pipe	9 12	327 \ 955 \	1888
Bowery F	From east line of Gold street, east in center of street to South Jefferson street; thence northeasterly on a curve to the sewer in said street last mentioned	Gl'zd Pipe	9	314	1883
BoweryF	rom east line of Winter street, east in north gutter of street to near alley between Mt. Vernon and Summer streets; thence southeasterly on a curve to the sewer in said alley	Brick	72	710	1876
BroadwayI	From North street, south in center of street to West Bridge street; thence southwesterly on a curve to the sewer in said West Bridge street	Brick	22x33 35x45 41x53	1311 }	79-80
Cadwell,F	from alley north of West Bridge street, north in center of street to First street; thence northeasterly on a curve to the sewer in said last mentioned street	Gl'zd Pipe	9	300	1890
CrosbyE	From 17 feet east of Tamarac street, east in center of street to Alpine avenue; thence southeasterly on a curve to the sewer in said street last mentioned		9 12		1888
CourtF	From 80 feet south of West Bridge street, south in center of street to sewer in Valley street		12	598	1873
Davis F	From West Leonard street, south in the center of the street to Seventh street; thence southeasterly on a curve to the sewer in said last mentioned street	Brick	30x45 40x52	1330 }	81-82
Eighth	From west line of North Front street, west in center of street to Broadway street, thence southwesterly on a curve to the sewer in said street last mentioned	Brick	16 x2 4	885	1882

STREET.	LOCATION.	Kind.	Size in Inches.	Length in Feet.	When Built.
Eleventh	From Jeanette street, east in center of street to Davis street; thence southeasterly on a curve to the sewer in said Davis street		12 18x27	423 640	1890 1887
Eleventh	From 45 feet west of Grand Rapids & Indiana railroad, west in center of street to Davis street: thence southwesterly on a curve to sewer in said Davis street	Gl'zd Pipe	9 15x24	294) 306 }	1887
Eleventh	From 20 feet east of Chicago & West Michigan railroad, east in center of street to Broadway; thence southeasterly to sewer in said last mentioned street	Gl'zd Pipe	9 12 16x24	180) 317 } 443 }	1887
Eleventh	From North Front street, west in center of street to Broadway street; thence southwesterly on a curve to the sewer in said street last mentioned	Gl'zd Pipe Brick	12 16x24	265 } 614 \$	1887
Fifth1	From east line of Stocking street, east in center of street to Broadway street, thence southeasterly on a curve to the sewer in said Broadway street	Gl'zd Pipe	12 12	2030 337	1871 1880
First	From 50 feet west of North Front street, west in center of street to Broadway street; thence south- westerly on a curve to the sewer in said last mentioned street		12	815	1880
First	From 50 feet west of Broadway street, west in center of street to Alabama street; thence south westerly on a curve to the sewer in said last mentioned street		9	394	1889
First	From 50 feet east of Seward street, east in center of street to Alabama street; thence southeasterly on a curve to the sewer in said Alabama street		9	280	1889
First	From 50 feet west of Seward street, west in center of street to North Jefferson street; thence southwesterly on a curve to the sewer in said last mentioned street		9	317	1889
First	From 54 feet east of Stocking street, east in center of street to North Jefferson street; thence southeasterly on a curve to the sewer in said North Jefferson street	Gl'zd Pipe	9	200	1889

STREET.	LOCATION.	Kind.	Size in Inches.	Length in Feet.	When Built.
First	From 66 feet east of Michigan street, east in center of street to Stocking street; thence southeasterly on a curve to the sewer in said last mentioned street		9	75°	1889
First	From Michigan street, west in cen- ter of street to Fremont street; thence southwesterly on a curve to sewer in said Fremont street		12	7 ⁸ 7	1886
Fourth	From west line of Stocking street, east in south gutter of street to so-called Turner ditch; thence to center of street; and from thence to Broadway street; thence south-easterly on a curve to the sewer in said Broadway street		18x27 16x24		68-69 18 8 0
Fourth	From North Front street, west in center of street to Broadway street; thence southwesterly on a curve to sewer in said last mentioned street		16x24	865	1881
Fourth	From Michigan street, west in cen- ter of street to Fremont street; thence southwesterly on a curve to sewer in said Fremont street		9	783	1886
Fourth	From 50 feet east of North Lane avenue, east in center of street to Fremont street; thence southeasterly on a curve to sewer in said last mentioned street		9	392	1886
Fremont	From Walker avenue, south in cen- ter of street to West Bridge street; thence southwesterly on a curve to a sewer in said street last mentioned	Brick	12 16x24 18x27 20x30 24x36	366 364	1890 83-84
Gold	From center of Shawmut avenue, north in center of street to Sibley street; thence northwesterly on a curve to sewer in said Sibley street	Gl'zd Pipe	9	342 .	. 1885
Gold	From 50 feet south of West Bridge street, south in center of street to Sibley street; thence southwest erly on a curve to the sewer in said last mentioned street	Gl'zd Pipe	9 12	608) 638 (1888
Hamilton	From Crosby street, south in center of street to West Leonard street; thence southeasterly on a curve to the sewer in said street last mentioned	Gl'zd Pipe	9	593	1887

STREET.	LOCATION.	Kind.	Size in Inches.	Length in Feet.	When Built.
Lincoln	From Third street, south in center of street to near alley between First and West Bridge street; thence southwesterly on a curve to west side of street at center of said alley		12	992	1890
Lincoln	From reservoir in said street, be- tween Twelfth and West Leonard streets, southeasterly across said street and across private property to the so-called west side ditch		12	462	1887
Michigan	From 50 feet south of Fourth street, south in center of street to First street; thence southwesterly on a curve to the sewer in said street last mentioned		9	1063	1886
Nagold	From 58 feet west of Stocking street, west in center of street to Fremont street; thence southwesterly on a curve to the sewer in said last mentioned street		9	680	1890
North Front	From 25 feet south of Eleventh street, south in center of street to Eighth street; thence southwesterly on a curve to the sewer in said Eighth street		9 12		1883
North Front	From 25 feet north of Second street, north 33 feet east of the west line of the street to Fourth street; thence northwesterly on a curve to the sewer in said last mentioned street	Gl'zd Pipe	9 12	344 <u>}</u> 481 ∫	1875
North Front	From Sixth street, south 33 feet east of the west line of the street to Fourth street; thence southwesterly on a curve to the sewer in said Fourth street		12	780	1882
North Front	From 40 feet north of Sixth street, north 33 feet east of west line of street to Eighth street; thence northwesterly on a curve to the sewer in said street last mentioned.		9	475	1828
North Jefferson	n. From north line of Third street, south in center of street to Second street; thence southeasterly on a curve to the sewer in said Second street	Brick	18 x2 7	397	1867

STREET.	LOCATION.	Kind.	Size in Inches.	Length in Feet.	When Buitt
North Jefferson	n. From Second street, south in cen- ter of street to West Bridge street; thence southeasterly on a curve to the sewer in said last mentioned street		12	796	1888
Quarry	From 353 feet north of Eleventh street, south in center of street to said Eleventh street; thence south-easterly on a curve to the sewer in said last mentioned street	Gl'zd Pipe	9	403	1885
Scribnerl	From 437.5 feet south of West Leonard street, north in center of street to said West Leonard street; thence northwesterly on a curve to sewer in said West Leonard street.	Gl'zd Pipe	} 9 { 12	250 <u>}</u> 220 ∫	1890
Scribner	From 727 feet north of Eleventh street, south in center of street to said Eleventh street; thence southwesterly on a curve to sewer in said last mentioned street	Gl'zd Pipe	} 9 12	250 { 525 {	1890
Scribner	From Eleventh street, south in cen- ter of street to Eighth street; thence southwesterly on a curve to the sewer in said street last men- tioned	Gl'zd Pipe	} 9 12	750 } 316 }	1887
Scribner	From 277 feet north of Sixth street, south in center of street to Fourth street; thence southwesterly on a curve to the sewer in said last mentioned street	Gl'zd Pipe	9 12	742 { 382 {	1887
Second	From North Jefferson street, east in center of street to Broadway street; thence southeasterly on a curve to sewer in said Broadway street	Brick	18x24 16x24	834 257	1867 188 0
Second	From Scribner street, west in center of street to Broadway street; thence southwesterly on a curve to the sewer in said last mentioned street	Gl'zd Pipe	9	600	1885
Second	From 80 feet east of Michigan street, east in center of street to Stocking street; thence southeasterly on a curve to sewer in the last mentioned street	Gl'zd Pipe	9	514	1890
Second	From 100 feet east of Stocking street, east in center of street to North Jefferson street; thence southwesterly on a curve to the sewer in said last mentioned street	Gl'zd Pipe	9	372	1890

STREET.	LOCATION.	Kind.	Size in Inches.	Length in Feet.	When Built.
Seventh	From Alpine avenue, east in center of street to Broadway street; thence southeasterly on a curve to the sewer in said street last mentioned	Brick	20x30		1881 81-82
Sibley	From West Division street, west to the so-called West side ditch	Gl'zd Pipe Brick	15 16x24	333 328 330	1890
		1.6 6.6		321 } 10 } 1331 } 1269 }	1877
South Front	From Valley street, south in center of street to Allen street; thence southeasterly on a curve to the sewer in Allen street		72	48 0	1876
South Jefferson	street, north in center of Street to West Bridge street; thence northwesterly on a curve to the sewer in said last mentioned street		9	603	1880
South Jefferson	street, south in center of street to Sibley street; thence southwest- erly on a curve to the sewer in said Sibley street	Gl'zd Pipe	9	598	1880
South Jefferson	a.From 25 feet north of California street north in center of street to Sibley street; thence northwest- erly on a curve to the sewer in said last mentioned street	Gl'zd Pipe	9	622	1882
South Jefferson	n.From 66 feet south of California street, south in center of street to West Fulton street; thence south- easterly on a curve to sewer in said West Fulton street	Gl'zd Pipe	9 9	380 202	1883 1888
South Lane av.	From West Bridge street, south in center of street to Sibley street; thence southwesterly on a curve to sewer in said last mentioned street.	Brick :	28x42	1295	83-84
Springfield	From Fremont street, east near center of street to Stocking street; thence across said street last mentioned on curves to sewer in Fifth street	Gl'zd Pipe	9 12	600 } 136 }	1882
Stocking	From 20 feet south of Fourth street, southerly in center of street to West Bridge street; thence southeasterly on a curve to sewer in said street last mentioned	Gl'zd Pipe	9 12 9	440 (960 (471	1885 1890

STREET.	LOCATION.	Kind.	Size in Inches.	Length in Feet.	When Built
Straight	From 25 feet south of West Bridge street, south in center of street to Sibley street; thence southwesterly on a curve to sewer in said Sibley street	Gl'zd Pipe		306 } 978 \$	1882
Summer	From 150 feet north of Shawmut av., north in center of street to Bowery street sewer		16x24	1115	1867
Third	From west line of Scribner street, west in center of street to Broadway street sewer	Gl'zd Pipe	9	<u>5</u> 60	1870
Third	From east line of Scribner street, east in center of street to North Front street; thence northeasterly on a curve to the sewer in said last mentioned street	Gl'zd Pipe	9	240	1870
Third	From 167 feet west of Broadway street, east in center of street to said Broadway street; thence southeasterly on a curve to the sewer in said Broadway street	Gl'zd Pipe	12	228	1881
Turner	From 78 feet south of Eighth street, south in center of street to Fourth street; thence southwesterly on a curve to the sewer in said street last mentioned	Gl'zd Pipe	} 9 12 9	388 } 381 } 45¢	1887 1890
Turner	From 40 feet south of Eleventh street, south in center of street to Eighth street; thence southwesterly on a curve to the sewer in said Eighth street.	Gl'zd Pipe	9	366 } 650 \$	1888
Turner	From 75 feet north of West Bridge street, north in center of street to First street; thence northwesterly on a curve to the sewer in said street last mentioned	Gl'zd Pipe	9	300	1887
Turner	From 97 feet north of First street, north in center of street to Second street; thence northwesterly on a curve to the sewer in said Second street	Gl'zd Pipe	9	250	1890
TurnerI	From 75 feet north of Second street, north to Fourth street; thence northwesterly on a curve to the sewer in said last mentioned street.	Gl'zd Pipe	9	270 { 400 }	1890

STREET.	LOCATION.	Kind.	Size in Inches.	Length in Feet.	When Built
Valley	From alley between Court and Mt. Vernon streets, east in north gut- ter of street to North Front street; thence southeasterly on a curve to the sewer in said South Front				
	street	Brick	72	418	1876
Watson	From near east line of Shepard street, west in center of street to the so-called West side ditch	Gl'zd Pipe	12	1367	1890
West Bridge.	From 70 feet east of North Front street; west in center of street to Winter street; thence southwesterly on a curve to the sewer in said Winter street	Gl'zd Pipe	12 15 56 x 72	412) 634 } 194	1875 80-81
West Bridge	From west line of Straight street, east in center of street to Winter street; thence southeasterly on a curve to the sewer in said last mentioned street	Gl'zd Pipe Brick Brick	12 16x24 16x24	718 185 588 }	
West Bridge	From Fremont street, west in center of street to South Lane avenue; thence southwesterly on a curve to the sewer in said South Lane avenue	Brick	28x42	341 18	83-84
West Broadwa	y. From California street, south in center of street to West Fulton street; thence southeasterly on a curve to the sewer in said street last mentioned	Gl'zd Pipe	9	648	1888
West Broadwa	Bridge street, south of West Bridge street, south in center of street to Sibley street; thence southwesterly on a curve to the sewer in said street last men- tioned	Gl'zd Pipe	9 12	223) 1000 (1880
West Division	From Sibley street, north in west gutter of street to Bowery street extended westerly; thence northeasterly on a curve and east across private property to the sewer in said Bowery street	Gl'zd Pipe	15	1440	1869
West Division.	From 20 feet north of Veto street, north in west gutter of street to Sibley street; thence northwesterly on a curve to the sewer in said street last mentioned	Gl'zd Pipe	9	9 75	1886

STREET.	LOCATION.	Kind.	Size in Inches.	Length in Feet	When Built
West Fulton	From alley between Straight and West Broadway streets, east in center of street to Grand river	Brick	22 22x33 24x36 :8x27	66) 572) 510)	1875
		Gl'zd Pipe	15 12	537) 335 } 328 }	1879
		Brick Gl'zd Pipe	24x36	50	1884 1885
West Leonard.	From North Front street, west to Broadway street; thence southwesterly on a curve to the sewer in said last mentioned street	Brick	16 x24	875	1883
West Leonard.	From west line of Elizabeth street, east in center of street to Broadway street; thence southeasterly on a curve to the sewer in said Broadway street		9 16x24 22x33	66) 679 (291	1885 1881
West Leonard.	From 35 feet west of Grand Rapids & Indiana railroad track, west in center of street to Davis street; thence southwesterly on a curve to the sewer in said last mentioned street		9 22x33	340 } 312 }	1885
West Leonard.	From 17 feet east of Tamarac street, east in center of street to				
	Davis street; thence southeast- erly on a curve to the sewer in said Davis street	"	9 12 24x36	635 } 660 { 640	1890 1883
Winter	From West Bridge street, south in east gutter of street to Bowery street; thence southeasterly on a curve to the sewer in said street last mentioned	Brick	72	318	1876
Court and	From 40 feet north of Snawmut avenue, north to the sewer in Allen street	Gl'zd Pipe	9	393	1873
	From Bowery street, south to the sewer in Valley street	Brick	72	320	1876
	From 75 feet north of Allen street, north to sewer in Valley street	Gl'zd Pipe	9	381	1889
Court and	From 25 feet south of Shawmut avenue, south to sewer in West Fulton street	Gl'zd Pipe	9	922	1885

STREET.	LOCATION.	Kind.	Size in Inches.	Length in Feet	When Built.
Sumner and	From 25 feet north of Shawmut avenue, north to sewer in Allen street	Gl'zd Pipe	9 9	218 200	1885
Sumner and	From 160 feet north of Allen street, south to sewer in said Allen street	Gl'zd Pipe	9	193	1273
	From 200 feet north of Allen street, north to sewer in Bowery street	Gl'zd Pipe	9	615	1883
Sumner and	From 75 feet south of Shawmut avenue, south to sewer in West Fulton street		9	873	1882
	From 25 feet south of Valley street, south to sewer in Allen street		9	417	1883
Court and	From 50 feet north of Shawmut avenue, north to sewer in Allen street		9	383	, 1888
Alley west of Broadway.	From 150 feet north of Fifth street, south to sewer in said Fifth street.	Gl'zd Pipe	9	183	1883
Alley west of Broadway,	From 160 feet south of Sixth street, north to sewer in Seventh street		9 12	226 } 263 }	1884 .
	From 50 feet south of Fifth street, south to sewer in Fourth street	Gl'zd Pipe	9	317	1883
Alley west of Broadway street.	From 160 feet north of Third street, south to sewer in said Third street	Gl'zd Pipe	9	210	1883
Alley north of West Bridge street.	From Pettibone street, west to sewer in Fremont street	Gl'zd Pipe	9	378	1883
	From 88 feet east of Cadwell street, west to sewer in said Cadwell street		: 9	119	1890
	From 94 feet west of Cadwell street, east to sewer in said Cadwell street		9	125	1890
Alley north of West Bridge street.	From Lincoln street, west to so- called west side ditch	Gl'zd Pipe	12	215	1890
Second and	From 95 feet west of Michigan street, east to sewer in Fremont street		9	674	1887
Alley between South Jeffer-	From 20 feet north of Butterworth avenue, north to sewer in West Fulton street		9	597 600	1885 1889

STREET. LOCAT	ION.	Kind.	Size in I Inches. in	ength When Feet. Built.
Alley between From alley north Straight and avenue, north to West Broad-Fulton street way.	sewer in '	West Gl'zd I		637 1885 682 1889
Summary of lengths of variou	s sizes:			
EAST	SIDE SE	WERAGE.		
	PIPE SEWE	RS.		
Diameter in inches 9	12	From 12 to 18	From I8 to 24	Total
Length in miles7.378	8.679	3.112	0.541	19.544
	BRICK SEW	ERS.		
Diameter in inchesFrom 16 to 24	24 to 36	36 to 48	48 to 72	Total
Length in miles3.993	3-547	1.422	1.397	10.359
Wood sewers				
WEST	r side se	WERAGE.		
west	SIDE SE			
WEST		RS.	12 to 18	Total
	PIPE SEWE	RS. From	12 to 18 757	Total 12 365
Diameter in inches 9	PIPE SEWE	RS. From O.		
Diameter in inches 9	PIPE SEWE 12 5.118 BRICK SEWI	RS. From O.		
Diameter in inches	PIPE SEWE 12 5.118 BRICK SEWI	RS. From O. ERS.	757	12 365
Diameter in inches	12 5.118 BRICK SEWI 24 to 36 1.389	From O. BRS. 36 to 48 1.235	757 48 to 72 1.256	12 365 Total

NINETEENTH ANNUAL REPORT

OF THE

Board of Public Works

TO THE COMMON COUNCIL OF THE

CITY OF GRAND RAPIDS,

MICHIGAN.

THE FISCAL YEAR ENDING APRIL 30, 1892.

DEAN PRINTING CO.

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ANNUAL REPORT

OF THE

Board of Public Works

TO THE COMMON COUNCIL OF

THE CITY OF GRAND RAPIDS,

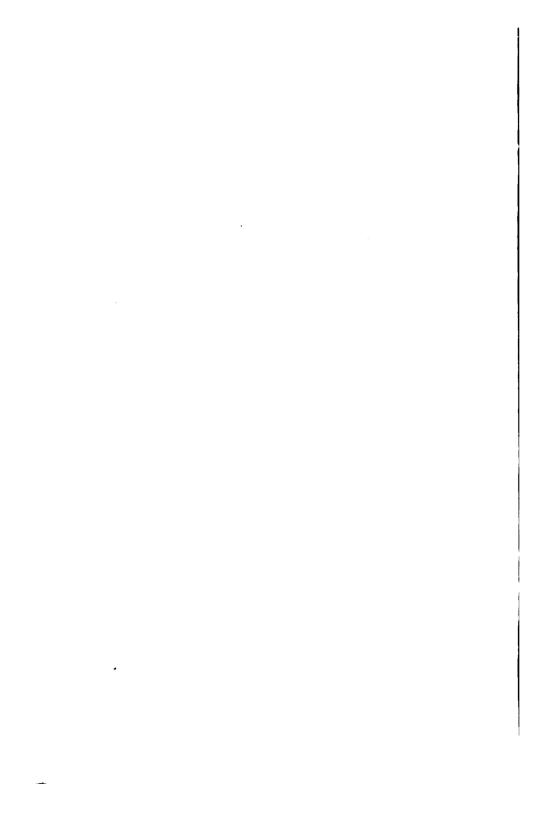
TRANSMITTING THE REPORTS OF

Secretary, City Engineer, Engineer of Pumping Station, and Inspector of Water Waste.

THE FISCAL YEAR ENDING APRIL 30, 1892.

Grand Rapids, Mich.

The Dean Printing and Publishing Company
1892.

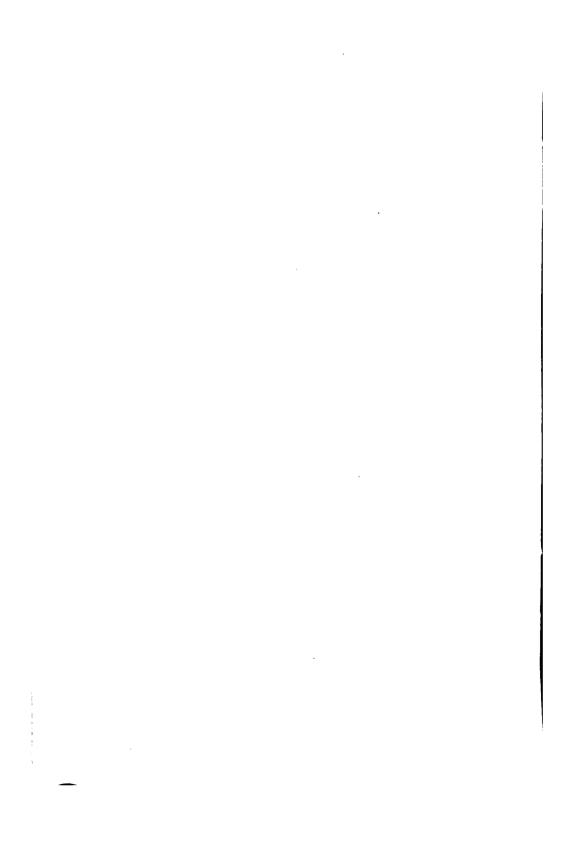


BOARD OF PUBLIC WORKS.

W. R. SHELBY, PRESIDENTTerm expires May,	1894
WM. J. STUART, MAYORTerm expires May,	1893
FRANCIS LETELLIER Term expires May,	1893
ELI F. HARRINGTONTerm expires May,	1893
HARVEY O. CARR Term expires May,	1894
A. E. WORDEN Term expires May,	1895

OFFICERS.

H. A. Collar
GEORGE M. AMES Assistant City Engineer
JAMES N. DAVIS
FRED A. TWAMLEY Secretary and Collector
THOMAS J. WILLARD
GEORGE E. KIRK Engineer of Pumping Station
JOHN VAN AMBERGSupt. of Repairs and Construction
A. PER LEE



REPORT OF THE BOARD.

OFFICE OF THE BOARD OF PUBLIC WORKS.

To the Honorable the Mayor and Common Council of the City of Grand Rapids:

Gentlemen—Herewith is transmitted the reports of the officers of the several departments under the control of the Board of Public Works for the year ending April 30, 1892:

CITY ENGINEER.

In the month of August, 1891, a corps of employes in the Engineer's department commenced surveys of the newly annexed territory to obtain the data necessary to locate streets, sewers, etc. The work consisted of surveying and placing monuments on all section, quarter section, and many eighth section corners, and the measurement of all angles at principal corners, and the elevation at different points. This work is in a forward state of completion and will be mapped as expeditiously as possible.

Grade lines of streets and alleys have been established aggregating 43.6 miles.

The work on bridges consisted of re-planking Bridge street and Leonard street bridges.

In public buildings we report the completion and occupancy of engine houses No. 7 and No. 9, and the erection of Police Headquarters, now rapidly approaching completion.

In the Water Works Department there has been laid about twenty-eight miles of mains with 227 hydrants, a new Babcock and Wilcox boiler purchased, of 360 horse power, and a No. 8 Gaskill pump contracted for, with a capacity of 12,000,000 gallons every twenty-four hours, which can be increased to 15,000,000 gallons with perfect safety.

There is also under contract an annex to the pumping station for the purpose of containing the new pumping machinery and for other uses.

The cost of the improvements in this department is as follows:

Street improvements	\$ 373,343 47
Sewers	52,540 00
Bridge repairs	3,184 40
Engine houses	15,051 77
Water works	162,954 68
Police headquarters, electric wiring and concrete	
floors	1,119 00
Total	\$608,193 32
There has also been expended in uncompleted im follows:	provements as
Police headquarters	\$36,222 27
Streets	24,822 20
Sewers	14,379 02
Sewers	
Making a total of expenditures under the direc-	
tion of the Board of Public Works of	\$683,616 81
WATER WORKS.	
Number of miles of mains	95
Number of fire hydrants	
Number of services now open	
Receipts from water rates, fines and permits	\$56,804 64
Cost of maintenance and operation	31,823 15
Excess of receipts over expenditures	\$24,981 49

11000.ptd 110111 1114y 1, 1074, to 1114y 1, 1092.	
From all sources	\$496,861 72
Paid for maintenance and operation to date	293,279 01

Net receipts over cost of maintenance and operation

Receipts from May 1 1874 to May 1 1802.

203,582 71

Total cost of works to date..... \$1,023,014 90

The report of the Engineer of the Pumping Station shows that there has been for the year ending April 30, 1892, water pumped to the amount of 2,236,448,555 gallons, a daily average of 6,121,776 gallons, an increase over the past year of 39 per cent. The cost of pumping 1,000,000 gallons of water is \$6.25. The cost of pumping 1,000,000 gallons of water last year was \$7.41.

The report of the Water Waste Inspector shows that the number of premises supplied with unmetered city water is 4,637.

Number of fixtures is as follows:

Baths	705
Closets	3,114
Wash basins	652
Sink faucets	2,065
Urinals	104
Hydrants, sill cocks, and street washers	5,000
Miscellaneous	481
Total	
	12,121
Number of fixtures for 1891	9,359

This shows an increase of 33 per cent for the year just past.

Respectfully submitted,

JAMES N. DAVIS, W. R. SHELBY. FRANCIS LETELLIER, ELI F. HARRINGTON. HARVEY O. CARR,

Board of Public Works.

SECRETARY'S REPORT.

Office Board of Public Works, Grand Rapids, Michigan, May 1, 1892.

To the Honorable Board of Public Works:

GENTLEMEN—I respectfully submit to your honorable h	oody the
following report for the year ending April 30, 1892:	
The number of services connected with the city's works on the 1st of May, 1891, for which permits were issued,	
were	3,725
Number of services put in the past year, for all of which	
permits were issued	911
Total	4,636
Number of special connections existing May 1, 1892	8 8
Total number of connections on May 1, 1892	4,724
Number of services now cut off	618
Number of services now open	4,106
The receipts for the year have been as follows:	
From water rates, fines, etc	4,679 64
From water permits	2,125 00
Total income from Water Works \$5	6,804 64
Miscellaneous receipts	1,920 07
	8,724 71
Cash on hand May 1, 1891	1,119 08
Total \$5	9,843 79

Deposits have been made with the City Treasurer during the year as follows:

3	
To the credit of the water works income fund	\$57,924 05
To the credit of the water works fund	600 00
To the credit of the general fund	45 00
To the credit of first and second district sewer funds	120 00
To the credit of the bridge fund	74 ⁸ 4
Total deposits during the year	\$58,763 89
Cash on hand to balance	1,079 90
Total	\$59,843 79
Receipts from May 1, 1874, the commencement to May 1, 1891:	of collections,
From water rates, fines, etc	\$406,240 27
From water permits	14,782 48
From various sources (per past reports)	17,114 26
Total	\$438,137 01
Receipts for the past year	58,724 71
Total receipts to date Deposits from May, 1874, to May 1, 1891:	\$496,861 72
To the credit of the water works income fund	\$421,818 55
To the credit of various funds (per past reports)	15,199 38
To the credit of various funds (per past reports)	
Total	\$437,017 93
Deposits made the past year	58,763 89
Cash on hand to balance	1,079 90
Total	\$496,861 72

STATEMENT OF EXPENDITURES.

MAY 1, 1891, TO MAY 1, 1892.

CONSTRUCTION OF WATER WORKS.

I-- PIPE SYSTEM.

Extension of mains Relaying of mains		\$124,215 52
2—Pumping Machinery, et	c., Low Serv	ICE.
New pumping engine	\$24,345 55	
New boiler, etc	8,241 57	
Foundations	5,292 24	\$37,879 36
3—Building	ss.	
Pumping station		\$139 72
4METERS	·.	
New meters and setting	• • • • • • • • • • • • • • • • • • • •	\$720 0 8
Total		\$162,954 68
Paid previous to May 1, 1891		860,060 22
Cost of works to date		\$1,023,014 90
The total bonded indebtedness for	water works	is \$912,000.00;

of this there is \$157,000.00 in the city treasury unexpended.

MAINTENANCE AND OPERATION OF WATER WORKS.

1-Pumping.

	•	
Salary engineer	\$1,500	00
Salary assistant engineer	900	00
Salary second assistant engineer	78 0	00
Salary third assistant engineer (in part)	559	83
Salary first fireman	6 00	00
Salary second fireman	600	00
Salary third fireman	520	00
Salary fourth fireman	48 0	00
Fuel	13,848	94
Repairs to machinery, suction pipe and foot valve	187	04
Repairs to boiler, etc	379	28
Repairs to pumping station	10	24
Supplies (oil, packing, etc.)	1,049	94
Telephone	40	00
Incidentals, car tickets, etc	19	60
	\$21,474	87
2—Office and Collecting.		
One-fourth salary clerk and collector	\$375	00
Salary assistant collector	720	00
Salary second assistant	428	12
Books, stationery and printing	72	55
Stamps and postals	100	25
Incidentals	2	68
·	\$1,698	60
3—Repairs and Inspection.		
Salary of superintendent of repairs and construction.	\$1,350	00
Salary of inspector of water waste	960	00
Iron pipe	216	75
Wyckoff pipe	44	50
Reservoir	31	50
Hydrants	476	97
Valves	152	10

Meters	699	10
Service connections	2,717	54
Tools and supplies	1,283	61
Barn and horses	567	o 8
Blowing off	95	00
Shop and storehouse	10	53
Telephone at superintendent's residence	40	00
Incidentals	5	00
	\$8,649	68
RECAPITULATION.		
Pumping	\$21,474	87
Office and collecting	1,698	6 0
Repairs and inspection	8,649	68
Total paid for maintenance and operation	\$31,823	15
Paid for maintenance and operation previous to May		
1, 1891	\$261,455	86
Paid during past year	31,823	15
Total paid for maintenance and operation to date	\$293,279	01
Income for the year	\$ 56,804	64
Cost of maintenance and operation	31,823	15
Excess of receipts over expenditures	\$24,981	49

Of the 459 meters last reported twenty one of them have been found unfit for further service and are not accounted for. The balance, with the fifty-eight meters purchased during the year, makes 496 meters owned by the city, as follows:

NAMES OF METERS.	Running	In shop	Total.
Ball & Fitts Rotary	50	6	56
Worthington	231	55	286
Crown	63	9	72
Ball & Fitts Piston	14	1	15
Duplex	36		36
Hersey	20		20
Thompson	5		5
Nash	5	1	6
Total	424	72	496

Twenty-five leaks on mains have been repaired; of these four were on Wyckoff pipe and 21 on 11 on 11 on 12 on 15 o

Two hundred and fifty-eight permits to connect with the public sewers were issued during the year.

Respectfully submitted,

FRED A. TWAMLEY,

Secretary and Collector.

ENGINEER OF PUMPING STATION REPORT.

GRAND RAPIDS, PUMPING STATION, May 1, 1892.

To the Honorable Board of Public Works:

GENTLEMEN—I have the honor to submit the engineer's report for the year ending May 1, 1892.

The average daily consumption of water for the year has been 6,121,776 gallons.

Against an average the previous year or 4,392,193 gallons.

An increase of 39 per cent.

Total cost of fuel to pump 1,000,000 gallons of water into the high and low systems, \$6.25.

Against a cost the previous year of \$7.41.

Total number of gallons of water pumped into the standpipe. 628,594,080 gallons.

The running expenses for the year have been:

For repairs to engines, boilers, grate bars, suction pipe		
and boiler house floor	572	24
For lights, oils, packing, waste, pump springs, and		
Morse reseating machine	976	65
For indicators and planimeter	198	00
For salaries of engineers and firemen	5,939	83
For coal delivered to boilers	14,024	10
Tr. A. I		_

The following table shows the number of days run for each month, number of revolutions made, gallons of water pumped, and amount of coal burned for pumping and raising steam, and cost of the same:

· · · · · · · ·		-			_				
Month.	Days run.	Total time run.	No. of revo- lutions made.	Gallons of water pumped.	Pounds of coal burnt.	Cost of coal.	Pounds of coal raising steam.	Cost of coal	Total cost of coal.
May	31	1,838:25	1,133,280	155,699,800	572,946	5982 6C	700	s1 20	\$983 8 0
June	30	1,342:30	1,238,920	168,640,200	599,916	1,004 21	2,250	3 67	1,007 88
July	31	1,479:20	1,592,891	208,953,305	726,394	1,187 65	3,050	4 98	1,192 63
August	31	1,566:35	1,790,872	231,683,110	820,985	1,842 30	4,010	6 55	1,348 85
September	30	1,429:40	1,586,480	210,979,300	740,802	1,211 21	2,508	4 10	1,215 31
October	81	1,445:45	1,468,420	202, 169, 500	757,177	1,237 98	2,263	3 70	1,241 68
November	30	1,317:15	1,343,604	167,845,495	689,487	1,127 31	2,685	4 30	1,131 61
December	31	1,485:40	1,249,912	179,875,960	690,644	1,129 20	2,515	4 11	1,133 31
January	31	1,473:55	1,368,620	189,646,600	725,914	1,186 86	3, 110	5 08	1,191 94
February	29	1,337:10	1,261,798	175,380,440	714,908	1,168 86	2,667	4 36	1,178 22
March	31	1,470:55	1,254,556	176,961,440	760,935	1,230 64	5,720	9 35	1,239 99
April	80	1,400:20	1,219,429	168,613,405	710,690	1,162 47	2,090	3 41	1,165 88
Total	366	17,087:30	16,508,277	2,236,448,555	8,510,793	\$13,971 29	33,518	s54 81	\$14,026 10
	ı	! -			l	1 1		l	l

Respectfully submitted,

GEORGE E. KIRK,

Engineer.

INSPECTOR'S REPORT.

OFFICE BOARD OF PUBLIC WORKS. CRAND RAPIDS, MICHIGAN, MAY 1, 1892.

To the Honorable Board of Public Works:

Gentlemen—I respectfully submit the following report for the year ending April 30, 1892:

Total number of premises supplied with city water (unmetered), 4,637. Total number of fixtures, 12,121, as follows:

Baths	705
Closets	3,114
Wash basins	652
Sink faucets	2,065
Urinals	104
Hydrants, sill cocks and street washers	5,000
Miscellaneous fixtures	481

During the year there has been 5,085 inspections made with the following result:

Number of leaks (and waste) discovered	338
Number of notices to water consumers	288
Notices to plumbers and drain layers	144
Number of services shut off	158
Number of services turned on	44

The following table shows the kind, number and location of water fixtures:

WARDS	Baths.	Closets.	Wash basins.	Sink faucets.	Urinals.	Hydrants, sill cocks and st.	Miscellaneous.	Premises.
First and Twelfth	42	260	36	203	5	578	38	617
Third, Tenth and Eleventh	398	1414	356	815	14	1881	235	1466
Second, Fourth and Fifth	169	813	140	568	25	1343	96	1318
Sixth and Seventh	37	243	39	169	12	443	33	744
Eighth and Ninth	52	353	46	180	11	716	40	492
Engine and School Houses	7	31	35	84	87	44	89	ļ
TOTAL	705	3114	652	2065	104	5000	481	4637
GRAND TOTAL	· · · · · · ·							12121

Respectfully submitted,

A. PER LEE,
Inspector.

CITY ENGINEER'S REPORT.

Office Board of Public Works, GRAND RAPIDS, MICHIGAN, May 1, 1892.

To the Honorable Board of Public Works:

Gentlemen—I have the honor to submit herewith a report of the work of my department, which covers surveys of the annexed territory, comprising about 8½ square miles, and all work of street improvement, sewerage, etc., which has been brought to completion, under your direction, during the fiscal year ending April 30, 1892.

Surveys of the additional territory, which were commenced last August, have not been completed, but are in progress.

The work consists in monumenting all section, quarter section and many quarter-quarter section corners, carefully measuring all section and quarter section lines, and the measurement of all angles at principal corners.

Maps comprising the territory surveyed before cold weather stopped field work have been made. Field work in this connection will soon be completed, and will be mapped as expeditiously as possible.

STREETS.

Grade lines have been adopted for the streets and alleys named in the following table, which aggregates 43.6 miles:

STREET.	FROM	то	Length in feet.
East Bridge	North East	East city limits	5, 250
Bates	South East	Fuller	2,560
West Bridge	Garfield avenue	West city limits	2,778
Bradburn	Thomas	Fifth avenue	591
Cherry	South East	Lake avenue	1,443
Alpine road	North street	D. G. H. & M. R. R	1,606

STREET	FROM	то	Length in feet.
Ann and Fifth	Canal	Plainfield avenue	2,82
Crofton avenue	' South Division	Clyde Park avenue	5,19
North Coit avenue	' Sweet	Ninth	2,57
South Division	Hall	Burton avenue	5,00
Centennial	East Leonard	Logan	11,15
South College avenue	Thomas	Fifth avenue	589
Capen	Yuba avenue	North East	599
Center	Buckeye	Logan	1,33
Center	. Sweet	Fifth	1,25
North East	. East Bridge	E. & W. 1/4 line	2,60
Dale avenue	Plainfield avenue	West to end of street	418
Dolbee	. Dosker	Bates	1,19
Dunham	South East	South Fuller	2,53
North Fuller	East Bridge	East Fulton	2,57
South Fuller	Wealthy avenue	Fifth avenue	2.56
Evergreen	South Fast	Kalamazoo avenue	2,190
East Fulton	' South East	East city limits	5,24
Fourth	. West Side Ditch (so called)	West city limits	2,68
South East	Hall	Burton avenue	4,97
Grandville avenue	Hall	Clyde Park avenue	2,29
Elizabeth	West Leonard	South	870
Elizabeth	North street	Broadway	1,20
Pearl	Monroe	The bridge	67.
Paris avenue		Fifth avenue	590
Summer		West Fulton	2,57
Plainfield avenue	Sweet	Fifth	1,44
Railroad	North East	Yuba avenue	600
Roy	Vries	Crofton avenue	250
Watrous	Dale avenue	Ann	92
Stoddard avenue	Sweet	Northward	566
Salem avenue		Home avenue	629
Tustin avenue	North East	Centennial	1,25
Shamrock Place	Grandville avenue	Eastward	1,12
Second	Canal	North Coit avenue	1,590
Sherman	South East	East city limits	
Vailey avenue	West Fulton	Walker avenue	'
Thomas	South East	Fuller,	2,56
Yuba avenue	East Bridge	Ives	1,75
Charles		Logan	58
			1

Canal	North Ionia	
Grandville avenue.		793
	Eastward	, 748
Walker avenue	North	3,930
South Front	Winter	1,059
Watrous	Canal	2,273
South Division	South Ionia	593
Grand river	River avenue	1,590
Butterworth	L. S. & M. S. R. R	733
Canal	Ottawa	502
Canal	Ottawa	506
Alpine avenue	Jennette,	359
East Fulton	Cherry	1, 123
North East	Centennial	1,290
Railroad avenue	Ives	1,192
Canal	North Ionia	796
South Division	South Ionia	595
West		2,644
Centennial	-	1.249
West Leonard		1,261
Canal	•	2,710
South East		2,537
South East		2,689
Fifth avenue	-	8,670
		2,561
		1,750
		3,670
		1,092
		917
1 -		2,578
		1,250
1		5, 162
1		3,844
1		1,722
ļ		
		5,210 3,846
!		ì
1		4,680
1		1
1		2,569 2,561
	South Division Grand river Butterworth Canal Canal Alpine avenue East Fulton North East Railroad avenue Canal South Division West Centennial West Leonard Canal South East Fifth avenue Madison avenue East Bridge Fairbanks Hall Jefferson avenue Seventh North East West South East Vest Vest South East Pearl Alpine avenue South East	Watrous. South Division Grand river River avenue Butterworth L. S. & M. S. R. R. Canal. Ottawa Canal. Ottawa Canal. Ottawa Alpine avenue. East Fulton North East. Canal. North Ionia South Division West. West city limits. Centennial. Fuller West Leonard Canal. Plainfield avenue. South East Fifth avenue. Burton avenue. Madison avenue. South Division South Division South East East Bridge Fountain. Fifth avenue. Morth East South East East Bridge Fountain Fountain Seventh West Leonard West Garier Hall Sieven Jefferson avenue South East Giddings avenue Pearl East Fulton Alpine avenue West city limits. South East Carrier Hall Sieven Jefferson avenue South East West Leonard North East Giddings avenue Pearl East Fulton Alpine avenue West city limits. South East Giddings avenue Pearl East Fulton Alpine avenue West city limits South East Giddings avenue Pearl East Fulton Alpine avenue West city limits South East Giddings avenue Ralamazoo avenue Sweet North Fifth avenue Hall.

STREET	FROM	то	Length in feet
Jenks avenue	South East	South Fuller	2,560
Winsor Place	Fifth avenue	Jenks avenue	592
North East	East Bridge	Fountain	1,750
Watkins avenue	South East	Fuller	2,561
Buckeye	South East	Centennial	1,241
Dosker	South East	South Fuller	2,563
Crawford	Madison avenue	Valley City Cemetery	992
Gilbert	Madison avenue	Valley City Cemetery	992
Emerald	Ives	East Leonard	3,390
Fair	South Division	Jefferson avenue	916
Livingston	Observatory	Coldbrook	1,229
Patton avenue	Winsor Place	South Fuller	2,280
Alexander avenue	South East	South Fuller	2,562
Charles	Sherman	Thomas	597
East Leonard	E. line, Sec. 18	East city limits	2,596
Clyde Park avenue	Grandville avenue	Burton avenue	2,902
Glenbrook	Diamond	Fuller	1,344
Burton avenue	East city limits	West city limits	15,842
Hillwood	East Bridge	Glenbrook	703
Cuming avenue	North East	Fuller	2,565
Jackson	Richards avenue	Garfield avenue	664
Richards	West Bridge	Shawmut avenue	1,311
Pleasant	Madison avenue	South Lafayette	654
	<u> </u>		

ALLEYS.

. ? = <i>2 :-2</i>	****	·	
BETWEEN	FROM	то	Length in feet.
Gold and West Broadway	Butterworth avenue	West Fulton	1,286
Pearl and Louis	. Campau	Grand river	230
Campan and the river	Louis	Above alley	168
Canal and Bank	Erie	Squires alley	210
East Fulton and Island	. South Division	Sheldon	242
Fountain and Julia	South Union	Grand avenue	510
	<u> </u>	¹	·

The following table names the streets that have been improved during the year. Therein is also noted the kind and character of such improvements and the cost of the same:

TABLE OF STREET IMPROVEMENTS BROUGHT TO COMPLETION DURING THE YEAR, SHOWING THE KIND AND CHARACTER OF IMPROVEMENTS AND THE COST OF SAME.

Total Contractors	\$3,480 00 H. Wagemacher. 280 00 H. Wagemacher. 13,284 00 A. C. Sekell. 15,200 00 A. C. Sekell. 24,117 00 Warren-Scharf Asphalt Paving Co. 9,803 55 Warren-Scharf Asphalt Paving Co. 7,400 00 Warren-Scharf Asphalt Paving Co. 1,000 00 C. Prange. 6,820 00 C. Prange. 2,100 00 J. McDermott. 4,700 00 L. Schneider. 4,700 00 L. Schneider. 1,480 00 Rens & Visser. 1,480 00 L. Schneider. 1,480 00 J. McDermott. 4,700 00 L. Schneider. 1,480 00 L. Schneider. 1,480 00 L. Schneider. 4,700 00 L. Schneider. 4,700 00 L. Schneider. 4,700 00 L. Schneider. 4,700 00 L. Schneider. 4,700 00 L. Schneider. 4,700 00 L. Schneider. 4,700 00 L. Schneider. 4,700 00 L. Schneider. 4,700 00 L. Schneider. 4,700 00 L. Schneider. 4,700 00 L. Schneider. 4,700 00 L. Schneider. 4,700 00 L. Schneider. 4,700 00 L. Schneider. 4,700 00 L. Schneider. 4,700 00 McDermott.
= Estimated Incidentals	\$119 00 58 50 409 00 240 00 544 00 1,783 00 306 55 1101 00 205 00 200 00 200 00 200 00 200 00 36 00 36 00 36 00 36 00 36 00 36 00 36 00 36 00
Contract Price	\$3,361 00 221 50 30,875 00 14,960 00 27,607 00 6,487 00 7,299 00 7,299 00 6,715 00 6,715 00 6,715 00 1,394 00 4,500 00 4,500 00 1,394 00 33,500 00 8,354 00
KIND OF IMPROVEMENT	Graded, graveled and gutters paved, stone curb
TO	S. East street South 132 feet. S. East street Madison avenue. Lyon street State street State street State street Sto called; Sweet street Madison street North street The bridge West Side Ditch So called; West Side Ditch So called; North street Madison street North street The bridge West Side Ditch Geo called; North street The bridge West Side Ditch Geo called; North street The bridge West Side Ditch Geo called; North street The bridge West Side Ditch Geo called; North street The bridge
FROM	East Fullon street. N. and S. Union st., S. East street Cherry street
STREET	East Fulton street N. and S. U. Grand av. E. half. Fountain str Cherry street

Monroe street	Pearl street	E. Fulton street	Repaved with Hallwood block brick, stone curb	32,500 00	786 15	33,286 15	J. H. Ulrick.
N. Ionia street	Monroe street	E. Fulton street	Repayed with Trinidad sheet asphalt payement,	9,864 00	294 90	10,158 90	Warren-Scharf As-
S. Ionia street	E. Fulton street	Oakes street	Repayed with Trinidad sheet asphalt pavement,	13, 100 00	306 60	13,406 60	Warren-Scharf As-
N. Waterloo street.	E Fulton street	Monroe street	Regraded and paved with Hallwood block brick, stone curb	13,200 00	424 50	13,624 50	J. H. Ulrick.
E. Wealthy av	S. East street	E. city limits	Graded, graveled and gutters paved, stone curb	11,975 00	425 00	18,400 00	Wagemacher & Myers.
Grand avenue	Fountain street	E. Fulton street	Graded, graveled and gutters paved, stone curb	2,035 00	105 00	2,140 00	J. Myers.
Jennette strect	Seventh street	W. Leonard street.	Graded, graveled and gutters paved	3,631 00	269 00	3,900 00	W. D. Hembling.
Crescent avenue	N. Union street	Grand avenue	Graded, graveled and gutters paved,	1,275 00	95 00	1,370 00	A. Vetting.
E. Bridge street	N. East street	Fuller street	Graded, graveled and gutters paved	6,416 00	134 00	6,650 00	Hayden & Owen.
Pearl street	Ottawa street	The bridge	Repaved with Hallwood block brick, stone curb	12,940 00	310 00	13,250 00	Mathewson & Kloote.
King street	Grandville avenue.	Westward	Graded, graveled and gutters paved	795 00	105 00	00 006	A. Vetting,
Valley street	S. Front street	Winter street	Graded, graveled and gutters paved	3,450 00	150 00	3,600 00	W. D. Hembling.
N. Coit avenue	Plainfield avenue	Sweet street	Graded, graveled and gutters paved, stone curb	3,100 00	100 00	3,200 00	C. Prange.
S. East street	Hall street	Burton avenue	Graded, graveled and gutters paved	16,342 00	458 00	16,800 00	Peterson & Skeels.
Kent street	Hastings street	Mason street	Graded, graveled and gutters paved, stone curb	7,950 00	250 06	8,200 00	C. Prange.
Bowery street	S. Front street	Winter street	Graded, graveled and gutters paved	00 008,0	200 00	5,500 00	J. Hoey.
Frie street	Canal street	Bank street	Graded and paved with cobble stones, stone curb	485 00	105 00	00 009	J. Powers.
E. Bridge street	Canal street	To Canal bridge	Repayed with Trinidad asphalt sheet payement, stone curb.	2,356 40	00 86	2,454 40	Warren-Scharf As- phalt Paving Co.
Eleventh street	Alpine avenue	Jennette street	Graded, graveled and gutters paved	609 44	90 26	200 00	M. Tennis.
Eighth street	Alpine avenue	Jennette street	Graded, graveled and gutters paved	743 00	97 00	840 00	M. Tennis.
Thomas street	S. East street	Fuller street	Graded, graveled and gutters paved, stone curb	6,950 00	250 00	7,200 00	A. Vetting.
Trowbridge street	Canal street	Ottawa street	Graded, graveled and gutters paved, stone curb	1,243 00	87 00	1,330 00	Rens & Vanderveen
Fairbanks street	Canal street	Ottawa street	Graded, graveled and gutters paved, stone curb	1,600 00	100 00	1,700 00	Mathewson & Kloote,
Bradford street	Coit avenue	Clancy street	Graded, graveled and gutters paved	444 50	85 50	230 00	Rens & Hogendyk.
S. Lafayette street	S. Lafayette street. Wealthy avenue Fifth street	Fifth street	Graded, graveled and gutters paved, stone curb	5,285 00	165 00	5,450 00	J. DeBruen.
		_		-	i		

TABLE OF STREET IMPROVEMENTS BROUGHT TO COMPLETION DURING THE YEAR.—CONTINUED.

				_		
CONTRACTORS	1,500 00 J. McDermott. 8,280 00 C. Prange.	1	490 00 C. Prange.	380 00 J. McDermott.	1,030 00 Rens & Vanderveen	
Total	1,500 00	!	490 00	380 00	1,030 00	•
Contract Estimated Price Incidentals	110 00		71 00	85 00	105 00	-
Contract	1,390 00		419 00	295 00	925 00	1
KIND OF IMPROVEMENT	Tenth street Wealthy avenue B street Graded, graveled and gutters paved 8,100 00	ALLEYS.	Alley between N Ladayette and N. Propect. Propect Propect Alley bet Straight and Parings street. Graded and paved with cobble stones.	Graded and graveled	Division and Bost- Wick Lyon street Fountain street Graded and paved with cobble stones	
TO	Tenth street N. Front street Broadway		l'rowbridge street	and W. Broad- way	Fountain street	
FRO	N. Front street		Hastings street	W. Fulton street	Lyon street	
STREET	Tenth street		Alley between N Lafayette and N Prospect	way	Division and Bost- wick.	

The mileage of streets as variously improved is as follows: Graded and paved with Trinidad asphalt 1.321 Graded and paved with brick..... 1.368 Graded and paved with cedar blocks and cobble stone on a gravel foundation..... 4.083 Graded and paved with cedar blocks on gravel foundation. 2.270 Graded and paved with cedar blocks on plank foundation. .490 Graded and paved with cedar blocks on concrete foundation 1.496 Graded and paved with cobble stones on gravel..... 1.130 Graded and graveled, with cobble stone gutters..... 71.065 Graded and graveled roadway and gutters......... 30.983 7.172

In the foregoing there are 24,718 square yards of asphalt pavement, 32,478 square yards of brick pavement, and 34,349 square yards of block paving on a concrete foundation.

Not having completed the mapping of the annexed territory it is impossible, at this time, to give the total mileage of streets.

SEWERS.

Sewers completed during the year are noted in the following tabular statement:

TABLE SHOWING LOCATION, KIND, SIZE, LENGTH, COST, ETC., OF SEWERS CONSTRUCTED DURING THE YEAR.

Contractor.	\$21,400 00 \$1,700 00 \$23,100 00 R. Pickett.	Mathewson & Kloote. Kloote. Kloote. Kloote. J. O'Hara. S80 00 J. De Bruen. S80 00 J. Rens. S20 00 J. Schneider. S60 00 L
Total cost.	\$23, 100 00	3,600 00 820 00 630 00 1,380 00 660 00 640 00 440 00
Estimated inci- dentals and rock excava- tions.	\$1,700 00	350 00 106 00 116 00 132 00 150 00 117 00 117 00
Contract price.	\$21,400 00	3,260 00 714 00 514 00 1,448 00 588 00 1,300 00 715 00 843 00
Length in feet.	-	1,237 1,175 1,175 1,175 1,23 1,23 1,23 1,23 1,23 1,23 1,23 1,23
Catch basins.	64 A 10 to 4 (N - N : N - N
Manholes		. 4 4 20 20 20 20 20 20 20 20
SIZE AND KIND.		20-inch glazed pipe Brick, 42 in. diani 9-inch glazed pipe 1 Princh glazed pipe 1 Brich glazed pipe 1 Brich glazed pipe 12-inch glazed pipe 12-inch glazed pipe 13-inch glazed pipe 9-inch glazed pipe 9-inch glazed pipe 9-inch glazed pipe
LOCATION OF SEWER.	!	From North Union st. west to North College av. From Collax street south to Grove street From 114 ft. south of Wealthy av. to Sherman st. From 100 ft. s. of W. Leonard st. to Eleventh st. From Kellogg avenue to South East street From Valley av. to West Side Ditch (so called) From Gold street to Michigan street From Michigan street to Fremont street From Marion street to South Lane avenue From 48 ft. south of Sycamore at to Fifth av
STREET.	Canal street. Howland street Taylor street Grove street. Plainfield avenue. Madison street North avenue Fernando street.	Madison street Taylor street James street Hamilton street Lake avenue Third street West Bridge street West Bridge street West Bridge street Thompson street

	From 39 ft. south of Twelfth st. to Eleventh st	9 inch glaczd pipe	:	7 895	- 5	- 6	000	4	
Jennette street	From 40 ft. north of Twelfth st. to Leonard st	9-inch glazed pipe	:	628 (66	3	3	J. De Bruen.	
Eighth street	From Jennette street to Alpine avenue	9-inch glazed pipe	<u>:</u>	403	210 00	80 00	390 00	J. O'Hara,	
Charles street	From Buckeye street sewer to Wealthy avenue	9-inch glazed pipe	:	892	00 E6 1	81 00	280 00	J. O'Hara.	
East Fulton street	From Dennis street to South East street	9-inch glazed pipe	÷ ::	1,281	2,446 00	254 00	2,700 00	M. Tennis.	
South Lafayette street	From 100 ft. S. of E. Fulton st, to Washington st.	9-inch glazed pipe	:	789	643 00	87 00	130 00	J. Rens.	
West Fulton street	From Straight street to Shepard street	9-inch glazed pipe	4 4		1,360 00	:	1,360 00	J. De Bruen.	
East Wealthy avenue	From Center street to South East street	9-inch glazed pipe	* 	069	727 00	233 00	00 098	J. O'Hara.	
Cass street	From 100 ft. north of Powell st. to Fifth av	9-inch glazed pipe		379)	3		9		
Fifth avenue	From Cass street to Jefferson avenue	9-inch glazed pipe		329 \	3	3 8	3	J. Kens.	
Cass street	From Highland avenue to Powell street	9-inch glazed pipe	10 01	479	9 880 74	910 98	00 00	di di	
Powell street	From Cass street to Jefferson avenue	12-inch glazed pipe		263		2	8	Hogendyk.	
South Union street	From Wealthy avenue to Sherman street	12-inch glazed pipe	-8	1,344	1,350 00	200 00	1,550 00	L. Schneider.	
Bartlett street	From 160 ft. east of Ellsworth av. to South Ionia st. (reconstruction)	12-inch glazed pipe	<u>:</u> 8	089	902 00	88 00	00 066	L. Schneider.	
Bowery street	From 25 ft. east of S. Pine st. to S. Lane av	9-inch glazed pipe		296	227 89	72 11	300 00	Vanderveen &	
Terrace avenue	From Pleasant street to Logan street	9-inch glazed pipe		800	1,040 00	160 00	1,200 00	Spaaman. L. Schneider,	
Tenth avenue	From 130 ft. east of S. Ionia st. to S. Division st	9 inch glazed pipe		514	260 00	00 06	330 00	J. O'Hara.	
Henry street	From 100 ft. south of Wealthy av, to Sherman st.	9-inch glazed pipe	-	1,200	1034 00	160 00	1,100 00	J. O'Hara,	
Springfield avenue	From Fremont street west 250 feet	9-inch glazed pipe	_:	300	236 00	24 00	300 00	M. Tennis.	
Central avenue	From Sycamore street to Fifth avenue	9-inch glazed pipe	-	263	366 00	8 00	120 00	L. Schneider.	
East Wealthy avenue	From west line Center street east 266 feet	9-inch glazed pipe	-	266	245 00	25 90	300 00	O. White.	
Scribner street	From end of sewer between Sixth and Eighth streets north 100 feet	9-inch glazed pipe	_ :	92	89 00	31 00	110 00	L. Schneider.	
Second avenue.	From west line Carpenter's add, to Grandville av.	9-inch glazed pipe		:	27.1 00	00 61	350 00	J. Owen.	
st. and Wealthy av	From 30 ft, east of Finney st. to Grandville av	9-inch glazed pipe	_ <u>:</u> -	250	179 00	61 00	210 00	J. Rens.	
ferson street	From Watson street to West Fulton street	9-inch glazed pipe		285	123 26	86 74	210 00	Rens &	
Second streets	From Lincoln street east 390 feet	9-inch glazed pipe	-:	429	388 26	81 74	00 021	M. Tennis.	
North Union street	From 25 ft. south of Julia sr. to Fountain st	9 inch glazed pipe		311	190 00	90 08	270 00	Rens& Hogendyk.	

The foregoing tables comprise brick and tile sewers to the extent of 6.36 miles. In this work there was constructed 118 man holes and 46 catch basins.

The system of sewerage so far completed is 56.102 miles in extent; and is comprised of the materials noted in the following:

	MILES.
Brick sewers	18.275
Glazed pipe sewers	36.922
Cement pipe sewers	0.134
Wood sewers	0.610
Iron pipe in river	0. 161
Total	56. 102

BRIDGES.

The only work in connection with the bridges has been the procurement of the oak plank for reflooring the roadway of the Bridge and Leonard street bridges. The cost of the work, including labor and materials, was \$3,184.40.

ENGINE HOUSES.

Engine house No. 7 is located at the north-east corner of West Leonard and Quarry streets, and Engine house No. 9 is located on Madison avenue, about 140 feet south of Fifth avenue.

These houses are alike in points of construction, after plans prepared by Wm. G. Robinson, architect, of this city. The fronts are of red brick with cut stone and galvanized iron trimmings. The first floor comprises the office, hose tower, apparatus room, stalls and barn. The dormitory and bath room are over the apparatus and office room, and over stalls and barn is the hay loft. The buildings are heated by a furnace in the basement, under the office and hose tower.

Contracts for erecting these houses were awarded to C. H. Pelton & Co., May 2, 1891. No. 7 cost \$7,455.70 and No. 9 cost \$7,596.07.

POLICE HEADQUARTERS.

Police headquarters are located at the north east corner of Crescent avenue and Ottawa street.

The building is constructed after plans prepared by E. E. Myers, architect, of Detroit, Mich. The structure is of white brick with stone trimmings above the basement; the basement is faced with rock-faced stone in courses. This story contains two cell rooms, turnkey's rooms, boiler and wagon rooms. This latter room is connected with the barn where provision is made for eight horses.

The first story contains the general office, rooms for superintendent, captain and lieutenant, detectives, clerk of court, police judge, court room, jury, witness and ladies rooms.

The second story has office and session rooms of the Board of Police and Fire Commissioners, sargeants' and detectives' rooms, patrolman's dormitory and other rooms.

The third story contains matron's and janitor's rooms, two store rooms and drill room.

General dimensions—South front, 73 feet 8 inches; west front, 88 feet 8 inches. The barn is 36x38 feet 8 inches.

The contract for constructing this building was awarded June 27, 1891, to C. F. W. Gentz for \$40,784, and will be completed, ready for occupancy, about July 1 of the present year.

The contract for steam heating was awarded Weatherly & Pulte June 27, 1891, for \$2,190.00.

Sproul & McGurrin were awarded contract for plumbing headquarters and the barn June 27, 1891, for the sum of \$1,025.00.

Sidewalks around the building were to be laid by the Granite Stone Company for \$807.75 on a contract awarded April 2, 1892.

The concrete floors in the turnkey's and cell rooms were awarded the Asbestine Stone Company for \$345.00.

The wiring for electric lighting was done by Harnish & Champlin at a cost of \$774.00.

WATER WORKS.

In response to a communication from your honorable body to the Common Council relative to extending the water mains and other necessary betterments to the water system, which, it was estimated, would cost \$300,000 00, the Council designated June 30, 1891, as the time for the submission of the question of bonding the city for that sum to a vote thereon, by the qualified electors of the city. The result of the election was favorable to the issuance of the bonds.

Following that action there has been laid about 28 miles of mains with 227 hydrants, a new Babcock-Wilcox boiler purchased of 360 horse power, and a No. 8 Gaskill pump contracted for with the Holly Manufacturing Company of 12,000,000 gallons capacity in 24 hours.

There has also been executed a contract for the erection of an annex to the pumping house.

The amount expended so far in this connection is \$162,954.68.

RECAPITULATION.

Street improvements		\$373,313 4	7
Sewers		52,540 0	ю
Bridge repairs		3, 184 4	O,
Engine houses		15,051 7	7
Water works		162,954 6	8
5	(Wiring	774 O	Ю
Police headquarters	Wiring	345 0	,0
	-		
Total		\$608,193 3	2
There has been	paid on work under contract, b		
There has been pleted at this date, the	paid on work under contract, b	ut not com	1-
There has been pleted at this date, the Street improvements	paid on work under contract, b ne following named amounts:	ut not com	1-
There has been pleted at this date, the Street improvements Sewers	paid on work under contract, bee following named amounts:	ut not com	1-
There has been pleted at this date, the Street improvements Sewers	paid on work under contract, be following named amounts:	\$24,822 2 14,379 0 36,222 2	10 12 17 19

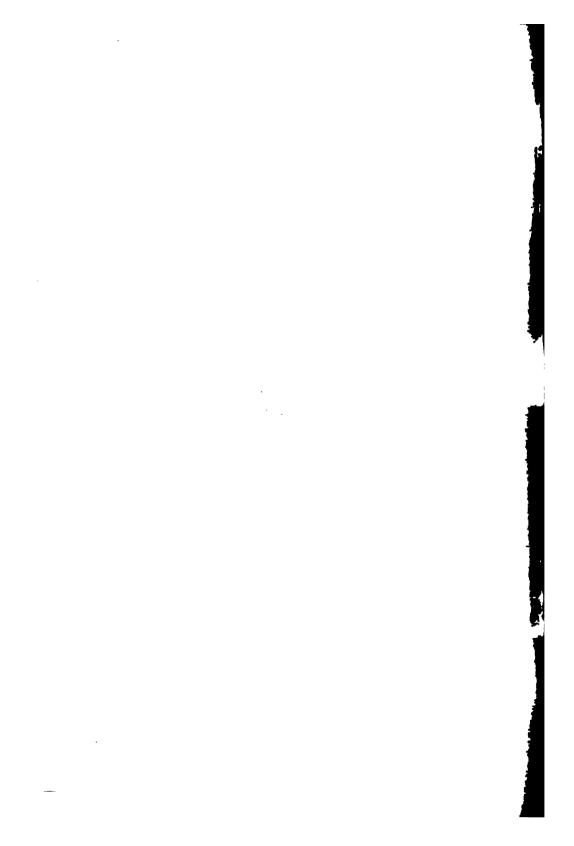
Expenses for engineering have been:

Salaries	\$8,195	54
Transportation, repairs, etc	250	56
Supplies for office	130	94
Cast iron street monuments	47	38
	\$8,624	42

Respectfully submitted,

H. A. Collar,

Engineer.



TWENTIETH ANNUAL REPORT

OF THE

Board of Public Works

THE THE COMMON COUNCIL OF THE

CITY OF GRAND RAPIDS.

MICHIGAN.

THE PERCAL VENUE EXCUSES APPRIL OF THEIR

DEAL PROPERTY OF

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ANNUAL REPORT

OF THE

BOARD OF PUBLIC WORKS

TO THE COMMON COUNCIL OF

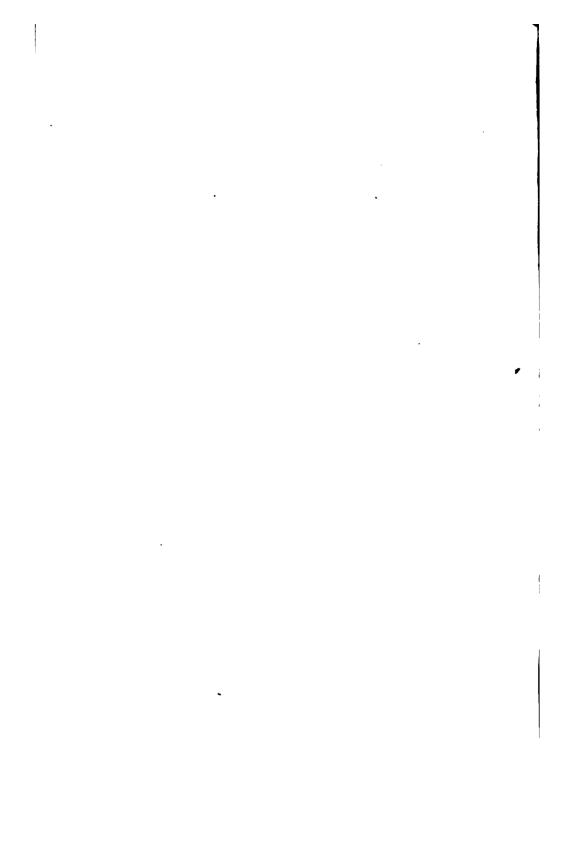
THE CITY OF GRAND RAPIDS,

TRANSMITTING THE REPORTS OF

Secretary, City Engineer, Engineer of Pumping Station and Inspector of Water Waste.

THE FISCAL YEAR ENDING APRIL 30, 1893.

GRAND RAPIDS, MICH.
The Dean Printing and Publishing Company,
1893.

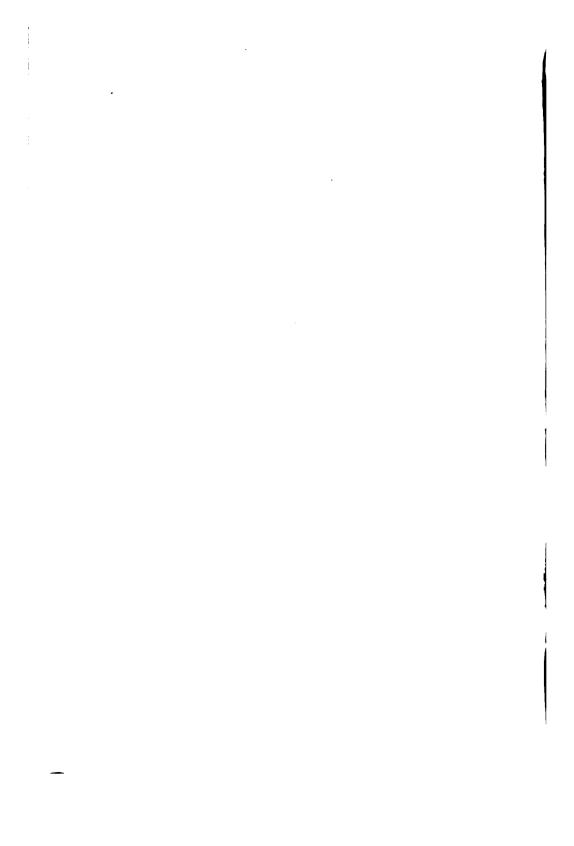


BOARD OF PUBLIC WORKS.

FRANCIS LETELLIER, PRESIDENTTerm expires May, 18	896
WM. J. STUART, MAYORTerm expires May, 18	894
A. E. WORDENTerm expires May, 18	895
JOSEPH A. McKEE Term expires May, 18	894
C. G. SWENSBERGTerm expires May, 18	896
ENOS PUTMAN Term expires May, 18	894

OFFICERS.

H. A. COLLAR City Engineer
GEORGE M. AMES Assistant City Engineer
James N. Davis
FRED A. TWAMLEY Secretary and Collector
THOMAS J. WILLARD Assistant Collector
E. A. Bates
JOHN VAN AMBERGSupt. of Repairs and Construction
A. Per Lee Inspecior



REPORT OF THE BOARD.

Office of the Board of Public Works.

To the Honorable the Common Council of the City of Grand Rapids:

GENTLEMEN—Herewith is transmitted the annual reports of the City Engineer, Secretary of the Board of Public Works, Engineer at the Pumping Station and Water Works Inspector.

These reports are a history of that department of our city under the direction of the Board of Public Works for the year ending April 30, 1893, the following being a summary:

STREETS AND ALLEYS.

	MILES. DECIMALS.
Grade lines established	28.84
Streets improved	13.55
Total number of miles of improved streets in the city is .	130.143
Total number of miles of unimproved streets	130.256
Total number of miles of streets	260.399

SEWERS.

Sewers of various sizes were constructed, to the extent of 15,092 miles and in connection therewith were built 259 manholes and 149 catch-basins, making the total length of sewers in the city 71.194 miles.

WATER WORKS.

The water works plant has been largely increased, the old building has been remodeled, a new annex built, the Gaskill Pumping engine been put in operation, the south pump rebuilt, a new battery of Babcock & Wilcox boilers erected and an addition of fifteen miles of iron water mains have been laid.

It has been the policy of the Board of Public Works to increase the extent of water mains as fast as the means furnished would allow, as will be seen by the following statement:

Extent of mains April 30, 1891, 67 miles. Extent of mains April 30, 1892, 95 miles. Extent of mains April 30, 1893, 110 miles.

The aggregate cost of the various improvements made during the year are as follows:

For streets and alleys	\$ 301,316 88
For sewers	110,337 60
For water works	108,170 14
Total	\$519,824 62
The income from the sale of water the past year was	\$66,487 85
The cost of maintenance and distribution was	35,250 60
Leaving a net revenue of	\$31,237 25

In nearly all the cities of the United States the water works departments are credited for water furnished for fire protection, in some this is done by a tax levy, others by a frontage tax, and in many by hydrant service; the average price of all cities reporting the latter system being \$45 per hydrant (this is only a fraction of the saving in insurance to the tax payers.) If this hydrant service was adopted by our city, the revenue from our plant would be large enough to pay the interest on water bonds, cost of maintenance and distribution, and leave a surplus to be used in needed extensions as will be seen by the following table:

Receipts from the sale of water 66,487 85 Supply to 1,073 hydrants at \$45 48,285 00	4 0 .
Total	\$114,772 85
Deduct therefrom the interest on water	
works bonds \$ 55,560 00	
Cost of maintenance and operation 35,250 60	
	90,810 60
Would leave a revenue of	\$23,962 25

Credit should also be given the system to a reasonable amount for the water furnished the public parks, city cemeteries, drinking fountains, for the flushing of sewers and washing of streets.

In this connection, it seems proper to state that, for the betterment of our water supply, there is now under contract a new intake (the old one having become inadequate) and a subsidence basin.

This subsidence basin is constructed of masonry walls; the bottom is sufficiently below the pump wells to allow the water as it slowly passes from the intake to the wells to deposit any sediment that may be contained therein. The basin is constructed in two parts, and so arranged that the sediment may be removed from one part, while the other is performing its required duty.

The new intake is nearly three times the size of the old one; it is blasted out of the solid rock, covered with a stone arch laid in cement; extends from the subsidence basin to a crib in the center of the river. The intake and subsidence basin are designed to take water from the center of the river, remove all sediment, and furnish our city with Grand River water in sufficient quantities for all purposes, in as pure a state as is practical without the construction of expensive filtering plants.

The amount of water pumped the past year was 2,627,765,036 gallons.

The entire cost of pumping was \$24,770.65.

The average daily consumption was 7,199,364½ gallons, being an increase of 17 per cent. over the previous year, while a large saving in fuel was effected.

The number of premises supplied with water is 5,911, an increase of 853.

The number of fixtures supplied is 14,647, an increase of 2,526.

There are also 68 fire connections, supplied free.

The increasing demand for water in the lower or what is known as the reservoir district, is amply provided for by the new Gaskill pumping engine for some time to come. The pumping capacity for the high service, however, is now taxed to a reasonable limit, and in order to provide for the increasing demand as the mains are extended, and that portion of the city built up, renders it imperative that additional pumping facilities be provided in the near future.

On the 21st day of July last, George E. Kirk, the engineer of the pumping station, died at his residence on East Leonard street after a brief but painful illness. In his death the city lost a good citizen and the Board a faithful and efficient officer who had been at his post of duty at the pumping station for sixteen years, the last eight years as Chief Engineer.

Respectfully submitted,

Francis Letellier,

A. E. Worden,

J. A. McKEE,

C. G. SWENSBERG,

Enos Putman,

Board of Public Works.

SECRETARY'S REPORT.

OFFICE BOARD OF PUBLIC WORKS, GRAND RAPIDS, MICHIGAN, MAY 1, 1893.

To the Honorable Board of Public Works:

GENTLEMEN—I respectfully submit to your hono the following report for the year ending April 30, 1893		ody
The number of services connected with the city's wor on the 1st of May, 1892, for which permits were issue	rks	
were Number of services put in the past year, for all of who		6 36
permits were issued		889
Total Number of special connections existing May 1, 1893	•	525 88
Total number of connections on May 1, 1893 Number of services now cut off	-	613 717
Number of services now open	4,	896
From water rates, fines, etc	\$64,407	85
From water permits	2, 080	00
Total income from Water Works	\$66,487	85
Miscellaneous receipts	5,310	49
Total receipts for the year	\$71,798	34
Cash on hand May 1, 1892	1,079	90
Total	\$72,878	24

Deposits have been made with the City Treasure	er during	the
year as follows:		
To the credit of the water works income fund	\$66,475	83
To the credit of the water works fund	3,779	35
To the credit of the general fund	40	00
To the credit of first and second district sewer funds	160	00
To the credit of the bridge fund	88	51
Total deposits during the year	\$70,543	69
Cash on hand to balance	2,334	55
Total	\$72,878	24
Receipts from May 1, 1874, the commencement o	f collectio	ns.
to May 1, 1892:		
From water rates, fines, etc	\$460,919	91
From water permits	16,907	48
From various sources (per past reports)	19,034	33
Total	\$496,861	72
Receipts for the past year	71,798	34

Receipts for the past year	71,798 34
Total receipts to date	\$568,660 o6
Deposits from May, 1874, to May 1, 1892:	
To the credit of the water works income fund	\$479,742 60
To the credit of various funds (per past reports)	16,039 22
Total	\$495,781 82
Deposits made the past year	70,543 69
Cash on hand to balance	2,334 55
Total	\$568,660,06

STATEMENT OF EXPENDITURES.

MAY 1, 1892, TO MAY 1, 1893.

CONSTRUCTION OF WATER WORKS.

I-PIPE SYSTEM.

Extension of mains Relaying of mains	\$51,026 65 4,760 71	\$ 55,787 36
2—Pumping Maci	HINERY.	
Gaskill pumping engine	\$20,122 18	
Rebuilding south pump	3,798 20	
Babcock & Wilcox boiler No. 3	6,516 72	
Steam pipe covering, etc	2,73 8 60	
Foundations for building, pump and		
boiler	1,279 03	\$34,454 73
3—BUILDINGS AND	GROUNDS.	
Addition to pumping station and re-		
modeling old station	\$13,155 45	
Electric light plant at pumping station	1,083 71	
Extending culvert	1,068 00	
		\$15,307 16

4-Basin.

Subsidence basin	\$2,082	50
5—Reservoir.		
Rebuilding fence	\$115	00
6—Water Supply.		
Analysis	\$ 30	00
7—Meters.		
New meters and setting	\$393	39
Total	-	•
Cost of works to date	\$1,131,185	04
The total bonded indebtedness for water works	is \$912,000.	00.

MAINTENANCE AND OPERATION OF WATER WORKS.

I-PUMPING.

Salary engineer in part	\$1,125 00
Salary four assistant engineers	3,091 06
Salary five firemen, one wiper, one coal passer, one	
laborer	3,565 45
Fuel	14,847 95
Repairs to pumping machinery, boilers, etc	496 41
Repairs to pumping station and shed	391 32
Supplies	1,178 07
Telephone rent	41 24
Street car tickets	34 15
	\$24,770 65

2-Office and Collecting.

One-fourth salary clerk and collector	\$375	00
Salary assistant collector	720	
Salary second assistant	480	00
Books, stationery and printing	118	
Stamps and postals	132	16
Incidentals	2	75
	\$1,827	91
3—Repairs and Inspection.		
Salary of superintendent of repairs and construction	\$1,350	00
Salary of inspector of water waste	1,050	00
Iron pipe	259	66
Wyckoff pipe	17	50
Filter and intake	22	70
Stand pipe	15	30
Hydrants	958	84
Sprinkling Hydrants	56	00
Valves	21	50
Meters	1,155	72
Services	2,153	50
Tools and supplies	1,137	50
Barn and horses	303	82
Shop and Storehouse	30	50
Blowing off	49	50
Telephone at superintendent's residence	40	00
Street car tickets	30	00
,	\$8,652	04
RECAPITULATION.		
Pumping	\$24,770	65
Office and collecting	1,827	-
Repairs and inspection	8,652	-
Total paid for maintenance and operation	\$35,250	6o

Paid for maintenance and operation previous to	
May 1, 1892	\$293,279 01
Paid during past year	35,250 60
Total paid for maintenance and operation to date	\$328,529 61
Income for the year	\$66,487 85
Cost of maintenance and operation	35,250 60
Excess of receipts over expenditures	\$31,237 25

Nine meters were purchased during the year, which, added to the 496 last reported, make a total of 505, as follows:

NAMES OF METERS.	Running	In shop	Total
Worthington	249	37	2>6
Crown,	61	11	72
Ball & Fitts Rotary	33	18	56
Ball & Fitts Duplex	33	3	36
Ball & Fitts Piston.	6	9	15
Hersey	27	2	29
Nash	4	2	6
Thompson	3	2	5
Total	421	81	:0 3

Eighteen leaks on mains have been repaired; of these two were on Wyckoff pipe and sixteen on iron pipe. Three hundred and seventy-three permits to connect with the public sewers were issued during the year.

Respectfully submitted,
FRED A. TWAMLEY,
Secretary and Collector.

ENGINEER OF PUMPING STATION REPORT.

GRAND RAPIDS WATER WORKS PUMPING STATION.

To the Honorable Board of Public Works:

GENTLEMEN-I have the honor to submit the engineer's report for the year ending May 1, 1893.

The following table shows the number of gallons of water pumped, the amount of coal burned for pumping and raising steam and the cost of the same:

MONTH.	Days run.	Gallons of water pumped.	Pounds of coal burned	Cost of coal
May	31	179,695,615	712,010	\$1,092 93
June	30	195,015,410	703,231	1,079 45
July	81	246,681,605	937,035	1,438 34
August	31	261,482,862	865,083	1,327 90
September	30	222,051,037	670, 100	1,028 60
October	31	216,618,389	755,445	1,159 61
November	30	199,428,062	679,442	1,042 94
December	31	220,684,732	661,700	1,015 71
Januaryrr	31	242,565,525	722,700	1,109 84
February	28	215,989,565	599,500	920 23
March	31	217,348,623	661,700	1,015 71
April	30	209,256,511	650,900	999 13
Total	365	2,627,768,036	8,618,846	\$13,228 98

The average daily consumption of water for the year has been 7,199,364½ gallons.

Against an average the previous year of 6,121,776 gallons, an increase of 17 per cent.

Total cost of fuel to pump 1,000,000 gollons of water into the high and low systems, \$4.64, against a cost the previous year, of \$6.25, a saving of 35 per cent.

Total number of gallons of water pumped into standpipe for the year ending May 1, 1893, 717,061,213, as against the amount pumped the previous year of 628,594,080 gallons, an increase of 14 per cent. in the high system.

Respectfully submitted,

E. A. Bates,

Engineer at Pumping Station.

INSPECTOR'S REPORT.

OFFICE BOARD OF PUBLIC WORKS, GRAND RAPIDS, MICHIGAN, MAY 1. 1893.

To the Honorable Board of Public Works:

GENTLEMEN—I respectfully submit the following report for the year ending April 30th, 1893:

Total number of premises supplied with city water (not metered), 5,490. Total number of fixtures, 14,647, as follows:

Baths	909
Closets	3,882
Wash basins	883
Sink faucets	2,384
Urinals	80
Hydrants and sill cocks	5,926
Miscellaneous	583

During the year there has been 5,000 inspections made, with the following result:

Number of leaks (and waste) discovered	456
Number of notices to water consumers	341
Number of notices to plumbers and drain layers	233
Number of services shut off	152
Number of services turned on	32

The following table shows the number, kind and location of water fixtures:

WARDS.	Baths	Closets	Wash basins	Sink faucets	Urinals	Hydrants and sill cocks	Miscellaneous
First and Twelfth	47	313	46	235	10	697	315
Second, Fourth and Fifth	228	912	211	686	25	1520	127
Third, Tenth and Eleventh	502	1832	452	1017	4	2226	266
Sixth and Seventh	75	500	67	224	8	882	63
Eighth and Ninth	50	294	51	183	13	546	48
School and Engine Houses	7	31	56	39	20	55	43
Total	909	3882	833	2384	80	5926	583
GRAND TOTAL			ļ				14647

Respectfully submitted,

A. PER LEE,

Inspector.

CITY ENGINEER'S REPORT.

OFFICE BOARD OF PUBLIC WORKS, GRAND RAPIDS, MICHIGAN, MAY 1, 1893.

To the Honorable Board of Public Works:

Gentlemen—I herewith submit my annual report, covering work done under your direction during the year ending April 30, 1893:

STREETS AND ALLEYS.

Grade lines to the extent of 28.84 miles have been adopted during the year, as listed in the following table, which shows the names of the streets for which lines have been adopted, their length and termini:

NAME OF STREET.	FROM	то	Length in feet.
Arthur avenue	East Fulton	Lyon	1266.00
Alger avenue	Wealthy avenue	North	936.00
Adams	Madison avenue	Kalamazoo avenue	4517.00
Alexander avenue	Fuller	Giddings	1234.00
Buchanan	. Hall	Burton avenue	5008.00
Bemis avenue	Sherman	Wealthy avenue	1253.50
Burton avenue,	Clyde avenue	South Division	5174.00
Barth	Wealthy avenue	Logan	660.50
Bemis avenue	Wealthy avenue	Hall	5219.50
Bates	South East	South Union	1247.00
Baldwin	Dwight	Packard	988,60
Campau	Louis	G. R. & I. R. R	322,00
Chicago avenue	Hall	East line W. D. Steven's Add.	1090,00
South College avenue	Cherry	Wealthy avenue	1253.00
Cherry	Spring	Ellsworth avenue	1078,00
Cottage Grove avenue	South Division	Kalamazoo avenue	7208.50
College boulevard	Oakland avenue	Storrs	2627.00
Cleveland avenue	Fifth avenue	Hall	2581.00
Columbus avenue	Alexander avenue	Hall	1254.00

NAME OF STREET.	FROM	то	Length in feet
Carlton	Fifth avenue	Hall.	2578.00
Carlton avenue	Fulton	Wealthy avenue	2521.00
Crosby	West	West end of street	1279.00
Dwight avenue	Lake avenue	Fulton	729.50
Dennis,	Fulton	Hermitage	584.20
Ethel avenue	Sherman	Wealthy avenue	1255.00
Ella avenue	Fuller	Ethel avenue	1703.40
Elia avenue	South East	South Fuller	2548.30
Elm avenue	South Division	Buchanan	1250.00
Fuller	Wealthy avenue	East Fulton	2538.00
Flat	North College avenue	North East	1918.70
Fifth avenue	Fuller	Giddings avenue	1306,50
Fitzhugh	Lake avenue	East Fulton,	1359.00
Fisk	Giddings avenue	Kalamazoo avenue	2747.50
Grandville avenue	Crofton avenue	Northward	440.00
Garden	South Division	Madison avenue	2201.80
Giddings avenue	Sherman	Wealthy avenue	1255,00
Gunnison	Veto	Butterworth avenue	2107.00
Griggs avenue	South East	North and south 1 line sec. 1.	7541.50
Godwin avenue	Oakdale avenue	Storrs	2633.00
Grove	Fuller	Diamond	1249.00
Grace	Carlton avenue	Eastern terminus	628.20
Hollister	Buckeye	Cherry	660.00
Hall	South East	Madison avenue	2570,00
Hazel	Fountain	Sophie	528,00
Hamilton	North	Alpine road	1022.50
Helen avenue	Diamond	Caroline	512.50
Humboldt	South East	Kalamazoo avenue	1118,00
Holland	East Fulton	Fountain	763,50
Island	Ellsworth avenue	Almy	523.00
unction	Sherman	Lake avenue	1244.00
Krekel avenue	Carlton avenue	Youell	708,50
Lake	South East	Barth	1250,00
Langdon	Fountain	Lyon	738,00
Lyon,	East	Houseman	596.00
Livingston street extension	East side city reservoir	***************************************	750.00
East Leonard	North East, produced	North Fuller	2595,60
South Lafayette	Davis avenue	Griggs avenue	1110,00
Laura avenue	Diamond	Caroline	511.50

NAME OF STREET.	FROM	то	Length in feet.
Lowell avenue	East Fulton	Lyon	1266,00
Lyon	. Fuller	East city limits	2593.50
Luten Court.,	Lake avenue	Fitzhugh	433.00
Milton avenue	. Silas	Youell	1195.00
Marshall	J. N. line right of way Reed Lake R. R	North end of street	2873.00
Martin,	. Crofton avenue	Griggs avenue	1255.00
Nathan avenue	. Wealthy avenue	Robinson avenue	804.20
Nelson	Alexander avenue	Hall	1256 00
Oakhill avenue	. South East	Kalamazoo avenue	970.00
Otsego	South Division	Jefferson avenue	921.00
Prospect avenue	West Bridge	Its south end	1000.00
Paris avenue	. Adams	Storrs ave	2954.50
Powers	South East	Kalamazoo avenue	1407.50
Packard	. Fulton	Lake avenue	355.00
Rural	., Sherman	Lake avenue	977.40
Richard Terrace	. Wealthy avenne	Lake avenue	627.50
Robinson avenue	East city limits	Lake avenue	1463,50
Russell avenue	Burton avenue	Griggs avenue	1287.00
Reynolds avenue	Madison avenue	Jefferson avenue	1232.00
Rose	South Division	Buchanan	1250.00
Sophie	Diamond	Houseman	591.50
Sinclair	Bradford	D., G. H. & M R. R	1070.00
Storrs avenue	Union boulevard	Madison avenue	1238.00
Susan	East	Kalamazoo avenue	1720.00
Seward	West Bridge	Fifth avenue	1910.60
School	Wealthy avenue	Robinson avenue	786.00
Stevens	South Ionia	South Division	596.40
Tennyson	Carlton avenue	Youell	708.50
Union boulevard	Adams	Burton avenue	3947.00
Umatilla	Madison avenue,	South Union	1252.00
Woodlawn ave	Madison avenue	South Union	1258.00
Wells	Wealthy avenue	Buckeye	658.00
Total length in feet			146364.2
Total length in miles			27.7

ALLEYS.

BETWEEN	FROM	то	Length in feet.
Mt. Vernon and Summer.,	Allen	Valley avenue	400.70
North Latayette and Clancy	Bradford	N. line E. and W. alley	612.60
Quimby and Colfax	Taylor	North Coit	1045.00
Blocks 1 and 3, Fralick's add	Madison avenue,	South Union	1246.00
Block 2, Mills add	Paris avenue	South Union	263,50
Kent and Ottawa	Crescent avenue	Bridge	525.00
In Tusch's sub. div., west of { Indiana street	West Bridge	Sibley	1253,50
Total length in feet,			5346.80
Total length in miles			1.12

Thirteen and fifty-five one hundredths miles of streets and alleys have been improved, as shown by the following table, which also shows the kind and character of the work, and cost of each improvement:

REGRADED AND PAVED WITH ASPHALT SHEET PAVEMENT.

SOUTH A CHANGE OF THE SAME OF	NAME OF CONTRACTORS			> warren-Shari Aspnali Faving Co.		TION.	C. Prange.	Mathewson & Kloote.	J. McDermott.	A. C. Sekell.	!	ION.	F. C. Schneider.
	Total Cost	\$11,340 00	12,675 88	13,290 00	5,700 00 \$43,005 88	E FOUNDA	\$5,500 00	3,700 00	2,651 80	11,367 50	\$28,219 30	FOUNDAT	\$1,339 00
COST	Estimated Incidentals	\$ 246 78	522 56	1,096 59	130 00	CONCRET	\$125 00	00 008	161 80	223 50		A PLANK	\$78 00
	Contract Price	\$11,093 22	12,153 32	12, 193 61	5,570 00	CKS ON A	\$5,375 00	3,500 00	2,490 00	11,144 00		BLOCKS ON	\$1,261 00
Length	in feet.	1,265	189	1,038	486	EDAR BLC	989	848	277	1,439	2,80	H CEDAR E	503
Ĥ	2	E. Fulton street Cherry street	Louis street	N. Division street	Crescent avenue	REGRADED AND PAVED WITH CEDAR BLOCKS ON A CONCRETE FOUNDATION.	S Ionia street	E. Fulton street	Lyon street Pearl street	The bridge at river		REGRADED AND PAVED WITH CEDAR BLOCKS ON A PLANK FOUNDATION.	The bridge at river
Mode	r KON		Pearl street,	Canal street	Lyon street	REGRADED	S. Division street	Louis street		Spring street		REGRADI	S. Front street The bridge at river
STREET.		*S. Lafayette street	*Ottawa street	*Crescent avenue	*Kent street Lyon street Crescent avenue		*Oakes street	*Ottawa street Louis street	Ottawa street	*E Fulton street			*W. Fulton street

\$636 40 \$37,506 40 L. Schneider.

\$86.870 00

6,458

*Grandville avenue..... Bartlett street,.... Hall street.....

* Improvements include upright stone curbs.

REGRADED AND PAVED WITH CEDAR BLOCKS ON GRAVEL FOUNDATION.

GRADED AND GRAVELED.

NAME OF CONTRACTOR.		,200 00 Peterson & Skeels.	1,400 00 L. Hoedemans.		\$580 00 C. Prange.		\$250 00 \$9,000 00 J. McDermott.	
	Total Cost	\$310 45 \$12, 200 60	1,400 00	 			\$9,000 00	
COST	Contract Estimated Total Cost	\$310 45	100 00	년	\$66.87		\$250 00	
	Contract Price	\$11,889 55	1,300 00	BLE STON	\$518 13	ZED.	\$8,750 00	
Length	in Feet	5,083	589	PAVED WITH COBBLE STONE.	278	MACADAMIZED.	1,935	
Ě	2	Burton avenue	Valley street.	PAVED	Bank street E. Bridge street Squires' alley		Fifth Avenue	
FROM		*S. Division street Hall street Burton avenue	W. Bridge street,		E. Bridge street		*Terrace avenue Logan street	* Improvements include upright stone curbs.
STREET		*S. Division street	Summer street W. Bridge street, Valley street.		Bank street		*Terrace avenue,	* Improvements in

GRADED, GRAVELED AND GUITERS PAVED.

			Length		COST		
SIRKEI	FROM	IO	in Feet	Contract Price	Estimated Incidentals	Total Cost	NAME OF CONTRACTOR.
*Pleasant		Madison avenue	1 09	\$1,200 00	00 08\$	\$1,280 00	J. Penney.
*Livingston	Extended around water works reservoir		150	3,095 00	95 00	3,150 00	J. В. Носу.
*Fifth avenue	S. East	Kalamazoo avenue	759	2,095 00	92 00	2,190 00	J. Myers.
*Logan	S. Union	S. East	1,265	3,590 00	110 00	3,500 00	Rens & Vanderveen,
*I.ogan	S. College avenue	S. Union	625	1.375 00	115 00	1,490 00	L. Hoedemans.
*Dunham	S. East	Dolbee	915	2,475 00	105 00	2,580 00	Rens & Vanderveen.
*Mason	Canal	Ottawa	501	1,482 75	77 25	1,560 00	Rens & Visser,
*Newberry	Canal	Ottawa	011	1,150 00	00 08	1,230 00	Rens & Visser.
*Walbridge	Canal	Ottawa	327	950 00	80 00	1,030 00	J. B. Hoey.
*Terrace avenue,	Highland avenue	Hall street	191	1,695 00	105 00	1,800 00	J. DeBruen.
*Tenth avenue	S. Division	Railroad grounds	893	1,874 00	96 96	1,970 00	Peterson & Skeels,
Seward	Fourth	Fifth	356	330 00	00 01	00 00*	M. Lehnen.
N. Pine	Walker avenue	Eleventh	787	00 006	100 00	1,000 00	W. D. Hembling.
*Wells	Buckeye	Wealthy avenue	674	1,765 00	95 90	1,860 00	J. Powers.
*Woodlawn avenue	Madison avenue	S. Union	1,268	3,190 00	140 00	3,330 00	Fred Vander Plow.
*Taylor	E. Leonard	Sweet	2,639	5,360 00	340 00	9,600 00	Rens & Visser,
*Madison avenue	Hall	Burton avenue	5,005	15,995 00	1,755 00	17,750 00	J. Hyland.
Fremont	Fourth	Walker avenue	1,094	2,000 00	140 00	2,140 00	J. B. Hoey.
Grand avenue	Lyon	N line Bissell's High- land Park addition	3,627	11,666 00	434 00	12,100 00	Pickett & Cowin,
*South East	E. Fulton	Cherry	1,147	3,580 00	170 00	9,700 00	J. Collins.
	!	i	1	_			

GRADED, GRAVELED AND GUITTERS PAVED, -- CONTINUED.

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F. G. G. F. G. G. F. G. G. F. G. G. F. G. G. F. G. G. F. G. G. F. G. G. F. F. G. F. G. F. F. G. F. F. G. F. F. G. F. F. F. F. F. F. F. F. F. F. F. F. F.	N.C. Car	- C	Length		COST		
21.05	FROM	2	in feet	Contract Price	Estimated Incidentals	Total Cost	NAME OF CONIKACION
*Lake avenue	South East Paddock	Paddock	1,564	4,272 00	168 00	4,440 00	Rens & Vanderveen,
*East Fulton South East East city limits	South East	East city limits	5,241	17,999 00	1,191 00	19,190 00	A. Vetting.
*Sweet	*Sweet Taylor N. Coit avenue	N. Coit avenue	1,068	3,100 00	150 00	3,250 00	J. McDermott,
*Sweet Taylor	Taylor	Canal	427	925 00	15 00	1,000 00	J. Powers.
*Charles	Wealthy avenue	Wealthy avenue Logan	809	1,850 00	130 00	1,980 00	J. Powers.
Lydia	N. College avenue	N. Union	627	2,570 00	91 60	+2,400 00	Rens & Hogendyk.
Stow	Fremont	Westward	431	675 00	105 00	780 00	Rens & Visser.
N. Lafayette	N. Lafayette Fairbanks Carrier	Carrier	3,748	17,779 41	69 007	18,180 00	M. Tennis.
Henry	Henry Fifth avenue Southward,	Southward	193	1,389 00	111 00	1,500 00	F. Vander Plow.
S. Union	S. Union Fifth avenue	Hall	2,591	9,495 00	205 00	+8,726 30	+8,726 30 Mathewson & Kloote.
Hamilton	North Broadway	Broadway	1,062	1,850 00	130 00	1,980 00	J. McDermott.
*I.yon		Barclay N. Union	2,447	6,400 00	260 00	6,740 00	J. Collins.
*Lyon	N. Division	N. Division Barclay	1,152	4,258 00	162 00	4,420 00	Rens & Vanderveen.
*Improvement includes upright curb stone.	pright curb stone.	+Cost reduced by change of grade while work was in progress.	ige of grade	while work w	as in progres		

COURT AND ALLEY IMPROVEMENTS, GRADED AND PAVED WITH COBBLE STONES.

Barciay street	Without			Length		COST		dotto a divide de divide
438	LOCATION			in Feet		Estimated Incidentals	Total Cost	NAME OF CONTRACTOR
175 217 00 63 00 280 00 400 300 00 80 00 890 00 210 240 54 59 46 300 00 500 640 00 100 00 640 00 625 589 00 111 00 700 00 242 216 00 84 00 300 00 3,270 450 00 70 00 620 00 GRAVELED. 510 212 80 67 20 80 00	Leonard Court	Barciay street .	N. Lafayette st.	4 38	\$447 19	\$62 81	\$510 00	Wm. Fitzpatrick.
400 300 00 80 00 380 00 210 240 54 59 46 300 00 500 430 00 100 00 640 00 525 589 00 111 00 700 00 242 216 00 84 00 300 00 3,270 450 00 70 00 520 00 GRAVELED. 212 80 57 20 270 00 510 212 80 57 20 80 00	Alley between Crescent avenue and Lyon street	Bostwick street.	Eastward	175	217 00	63 00	280 00	Wm. Fitzpatrick.
210 240 54 59 46 300 00 500 540 00 100 00 640 00 400 430 00 70 00 640 00 242 248 00 111 00 700 00 242 216 00 84 00 700 00 3,270 450 00 70 00 520 00 GRAVELED. 510 212 80 57 20 270 00	Alley between S. Division and S. Spring streets	Island street	Oakes street	007	300 00	90 03	380 00	Wm. Fitzpatrick.
500 540 00 100 00 640 00 400 430 00 70 00 550 00 242 218 00 84 00 700 00 3,270 450 00 70 00 520 00 GRAVELED. 510 212 80 57 20 270 00	Alley west of Canal street	Erie street	Squires' alley.	210	240 54	29 46	300 00	M. Tennis,
625 589 00 70 00 500 00 00 242 216 00 84 00 70 00 520 00 00 00 00 00 00 00 00 00 00 00 00 0	Alley between Ottawa and N. Ionia streets	E. Bridge st	Hastings street.	200	240 00	100 00	00 019	M. Tennis.
GRAVELED. 525 589 00 111 00 700 00 620 00 620 00 620 00 620 00 620 00 620 00 620 00 620 00 620 00 620 00 620 00	Alley between Court and Mt. Vernon streets	Allen street	Shawmut ave	8	430 00	20 00	200 00	Mathewson & Kloote,
GRAVELED. 342 450 00 70 00 520 00 GRAVELED. 510 284 48 00 32 00 89 00	Alley between Kent and Ottawa streets	Crescent ave	E. Bridge st	525	289 00	111 00	100 00	C. Prange.
GRAVELED. 510 264 48 00 82 00 82 00	Alley between E. Fulton and Island streets	S. Division st	Sheldon street.	242	216 00	84 00	300 00	J. Hyland.
GRAVELED. 510 212 80 57 20 270 00	Alley between Mt. Vernon and Summer streets	Allen street	Valley street	00+	420 00	20 00	520 00	
GRAVELED. 510 212 80 57 20 270 00				3,270				
510 212 80 57 20 270 00 264 48 00 82 00 80 00		0	RADED AND	GRAVELED				
264 48 00 82 00 80 00	Alley between Barclay and Lafayette streets	Lyon street	Leonard court.	510	212 80		270 00	L. Hoedemans.
	Alley between Wealthy avenue and Logan street	Paris avenue	S. Union st		48 00	32 00	80 00	J. DeBruen.
		_						

The total length of the streets of the city amount to 260.399 miles, of which there are:

Graded and paved with Trinidad asphalt	1.998
Graded and paved with brick	1.368
Graded and paved with cedar blocks and cobble stones,	
on gravel	3.432
Graded and paved with cedar blocks on plank	0.528
Graded and paved with cedar blocks on concrete	2.026
Graded and paved with cedar blocks on gravel	3.481
Graded and paved with cobble stones on gravel	1.182
Graded and graveled with cobble stone gutters	78.294
Graded and graveled roadway and gutters	30.662
Graded	7.172
Unimproved	130.256

SEWERS.

There has been considerable work done in the way of trunk lines of sewers, as also lateral work. The trunk lines extended open up for drainage several sections of the city that are quite thickly populated and in great need of sewerage.

The table following contains the names of streets in which sewers were built during the year, the length, size, kind and cost of same:

TABLE OF SEWERS, GIVING LOCATION, MATERIAL, SIZE, LENGTH AND COST.

LOCATION OF SEWER.		No. Manholes No. catch basins	3.9	Contract	Estimated inci- dentals and rock excava- tions,	Total cost.	Contractor.
From Brenner Court to Carrier street From North Union to North Lafayette street	12-inch glazed pipe 12-inch glazed pipe 15-inch glazed pipe		1 225 12 661 1,300				
From Carrier street to Page street	15-inch glazed pipe 15-inch glazed pipe 20-inch glazed pipe 24x36, brick, egg shaped.		3 325	86,877 60	\$180 00	s7,057 60	Rens & Hogendyk.
From 350 ft. north of Logan street to Mills street	9-inch glazed pipe	7	3 1,262	1,525 00	135 00	1,650 00	J. O'Hara.
From 25 ft. south of Julia st. to Fountain st From Madison avenue to Buchanan street	9-inch glazed pipe	- =	118	190 00	80 00	270 00	Rens & Hogendyk.
From Hall street to Fifth avenue.	38x57, brick, egg shaped	: 	2,623	24,300 00	00 002	25,000 00	Mustie & Van Overen.
From Webster street to West Leonard street	9 9-inch glazed pipe	. : •	1,263	1,527 00	613 00	2,140 00	M. Tennis.
From north line Scribner & Turner's add. north	9-inch glazed pipe		100	00 68	21 00	110 00	L. Schneider.
From east city limits to South East street	15-inch glazed pipe 20x30, brick, egg shaped. 22x33, brick, egg shaped	<u> </u>	1,291	7,368 00	482 00	7,850 00	J. O'Hara.
From Buchanan street to South Ionia street From west line Carpenter's add, to Grandville ave	9-inch glazed pipe	, ₋	384	271 00	8 8	350 00	350 00 J. Owens.
From Center street cast 200 feet	9-inch-glazed pipe	_	1 266	245 00	55 00	300 00	O. White.
From 100 ft. north of Wealthy ave. to Buckeyest.	9-inch glazed pipe	: -		210 00	20 00	280 00	00 Rens & Hogendyk
From Cherry street to Wealthy avenue	9-inch glazed pipe	-	2 1,446	00 766	136 00	1,130 00	F. C. Schneider.
From 200 ft. north of Wealthy ave. to Buckeyest	9-inch glazed pipe		# 2	300 00	00 09	260 00	O. White.
From South Diamond st. to South East st	9-inch glazed pipe	:	588	1,100 00	120 00	1,220 00	O. White.

TABLE OF SEWERS, GIVING LOCATION, MATERIAL, SIZE, LENGTH AND COST.—CONTINUED.

Contractor.	J. Owens.	O. White.	A. Vetting.	L. Schneider.	Rens & Venderveen.	P. Shane.	L. Schneider.	J. Collins.	R. R. Hayslett.	R. R. Hayslett,	R. R. Hayslett,		McLeod & Allison	J. Powers.		Mathewson	& Kloote.		680 00 O. White.
Total Cost.	\$540 00	430 00	00 006	170 00	00 089	260 00	00 097	830 00	260 00	340 00	3,080 00		675 00 11,900 00	130 00 1,000 00			3,820 00		
Estimated inci- dentals and rock excava- tions.	\$55 00	98	102 40	92 00	141 00	95 56	00 06	280 00	26 00	67 76	299 43		675 00	130 00			240 00		116 90
Contract Price.	\$485 00	344 00	197 60	115 00	239 00	19 44	370 00	920 00	204 00	272 24	2,780 64		11,325 00	870 00			00 080'%		644 00
Length in feet.	87 125	240	660 595	306	378	643	390	<u>5</u>	38	337	2 22 2	1,367	3 2	1,335	9 2	350	450	25 £	188
No.catch basins	<u>:</u>	:	<u>:</u>	:	_ :	60	:	<u>:</u>	:	<u>:</u>	13	6	2	•	Æ	40	_ <u>:</u>	_	<u>:</u>
No. Manholes	C1	~	*	-	~	63	~	~	_	-	46	*	1-	-	2	1	-	•	
SIZE AND KIND.	12-inch glazed pipe		9-inch glazed pipe		12-inch glazed pipe		13-inch glazed pipe	9-inch glazed pipe	9-inch glazed pipe		15-inch glazed pipe	30x45, brick, egg shaped	S2x42, brick, egg shaped	9-inch glazed pipe	12-inch glazed pipe	20-inch glazed pipe	20-inch glazed pipe	20-inch glazed pipe	•
LOCATION OF SEWER.	From 50 ft, west Canalst, to Butterworth tail race.	From 150 ft. south of Thomas st. to Fifth ave	From 42 ft. west of S. Union st, to Madison ave.	From E. Bridge street north 250 feet	From Olive street to Grand river	From Marion street to S. Lane avenue	From Fountain street to Park street,	From 48 ft. north of Second to Fourth street	From 60 ft, north of Thomas to Mills street	From 25 ft. s. of Court House alley to Lyon st	From Garden north to Hall street	From S. Union street to Madison avenue	From Fifth avenue to Hall street	From S. Lane avenue to west side ditch	From 100 ft. west of Madison to Central avenue.	From Highland avenue to Green street	From Central avenue to S. Division street	From Eleventh avenue to Hall street,	Fremont From Twelith to W. Leonard street
STREET.	Huron	Bradburn	Umatilla	N. College avenue	Letellier	Chatham	Bostwick	Scribner	S. Union	Kent	S. Division	Fifth avenue	Madison avenue	Jackson	Highland avenue	Central avenue	Green	S. Division	Fremont

TABLE OF SEWERS, GIVING LOCATION, MATERIAL, SIZE, LENGTH AND COST.—CONTINUED.

664 579 80 120 20 2,080 1,702 91 717 09 671 40 686 00 140 00 585 686 00 84 00 710 717 8 1,283 70 146 30 665 665 00 90 00 688 6 660 0 136 00 888 6 681 684 00 136 00 888 7 880	664 579 80 120 20 2,080 1,702 91 717 09 671 480 00 140 00 585 682 00 84 00 710 717 8 1,283 70 146 30 663 689 0 80 00 268	664 579 80 120 20 20 20 20 20 20 20 20 20 20 20 20 2	664 579 80 120 20 20 624 621 1.702 91 7.17 69 621 10 00 625 62 62 62 62 62 62 62 62 62 62 62 62 62	2,080 1,702 91 717 09 2,621 1,022 0 2,621 1,022 1 1,022 1 1,022 1 1,022 1 1,022 1 1,022 1 1,022 1 1,022 1 1,022 1 1,022 1 1,022 1 1,023 1 1,023 1 1,023 1 1,023 1 1,023 1 1,023 1 1,023 1 1,024 1,023 1 1,024 1 1,024 1 1,024 1 1,024 1 1,022
1,702 91 480 00 636 00 636 00 650 00 650 00 814 00 314 00	1,702 91 480 00 636 00 650 00 650 00 650 00 814 00 256 00	1,702 91 480 00 636 00 650 00 650 00 650 00 7 Built by 314 00 256 00 1,279 00	1,702 91 480 00 636 00 650 00 650 00 650 00 1,279 00 1,279 00	2,080 1,702 91 40 480 00 40 585 685 00 710 710 710 710 800 1710 710 800 1710 710 800 7110 800
870 40 585 1740 1797 6008 1,770 1,770 486	870 40 585 740 740 740 605 605 1,779 434	870 546 586 7197 605 808 (808 (1,779 } 436 434	8 7 0 4 0 5 0 5 0 7 1 0 7 6 0 5 0 8 0 0 6 0 1, 77 9 6 0 1, 28 6 1 1, 28 6 1 1, 28 6 1	8 7 0 9 4 0 9 4 0 9 9 9 9 9 9 9 9 9 9 9 9 9
× × × × × ×	2 2 2 4 2 2 2	N 2 N 4 5 N M 4	N 2 N 4 2 N 8 4 4	21 2 22 4 22 23 24 4 7 7
13-inch glazed pipe				
~ ~ ~ ~ ~ ~	2040000	20 64 4 00 64 64	20 C5 44 20 C5 C6 44 44	20 21 4 20 21 24 4 4 11
2 605 4 268 6 1,779 }	6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6	6 603 2 2864 6 8008 6 8008 7 1779 7 2 434 4 3 1,286	605 605 607 608 608 1,779 608 1,779 608 1,779 1,786 1,	2 603 4 2064 6 1,779 8 1,286 4 3 1,286 1 2 1,024
6 1,779 Built by 185 314 00	2 435 91 00 00 00 00 00 00 00 00 00 00 00 00 00	2 434 256 00 256 00 25 1,279 00 25 1,279 00 25 1,286 1,279 00 25 1,286 1,279 00 25 1,2	2 434 256 00 2 434 256 00 4 3 1,286 1,279 00 4 2 1,024 740 00	2 698 594 00 800 Built by 800 Built by 4 3 1,286 1,279 00 4 3 1,286 1,079 00 4 2 1,024 740 00
6 1,779 Built by Willia	2 1,779 Built by Willia 2 485 314 00 86 3 434 256 00 84	2 486 814 00 841 2 434 256 00 84 4 3 1,286 1,279 00 121	2 1,779 Built by Willin 2 435 314 00 86 2 434 256 00 84 4 3 1,286 1,279 00 121 4 2 1,024 740 00 100	2 435 Built by Willing 2 435 314 00 86 2 434 256 00 84 4 3 1,286 1,279 00 121 4 2 1,024 740 00 76
2 485 314 00 86	2 435 314 00 86 2 434 256 00 84	2 436 314 00 86 434 256 00 84 4 3 1,286 1,279 00 121	2 435 314 00 845 434 256 00 844 43 1,236 00 1211 44 2 1,024 740 00 100	2 486 314 00 86 2 434 256 00 84 4 3 1,286 1,279 00 121 4 2 1,024 740 00 100 1 2 1,024 740 00 76
	2 434 256 00 84	3 1,286 1,279 00 121	4 3 1,286 1,279 00 121 4 2 1,024 740 00 100	4 3 1,286 1,279 00 121 4 2 1,024 740 00 100 1 42 2 294 00 76

In the foregoing tables there is comprised brick sewers to the extent of 2.77 miles and of tile sewers 12.322 miles. In connection therewith there was constructed 259 manholes and 149 catch basins.

The system of sewerage is comprised of the materials and the extent of each as follows:

	MILES.
Brick sewers	21.045
Glazed pipe sewers	49.244
Cement pipe sewers	0.134
Wood sewers	0.610
Iron pipe sewers	0. 161
Total	71.194

WATER WORKS.

The annex to the pumping station built by Hosken & Maunder on a contract awarded April 11, 1892, was completed and settled for February 4, 1893, the sum of \$9,788.21 being paid therefor.

The steam generating plant has been increased by a new Babcox and Wilcox boiler of 360 horse power, at a cost of \$6,509.00.

The plant consists of four boilers of the aforementioned type, and one marine boiler, in total capable of producing 3000 horse power.

The old south pump (so called) has been rebuilt after plans prepared by engineer Kirk, and connected with the high service system. The cost of work has been \$3,798.20. The work was done by Wm. T. Powers & Son on a contract awarded March 26, 1892.

Hauser, Hayden & Owen were on January 7, 1893, awarded a contract for constructing a subsidence basin in the river, back of the pumping station, through which water must pass from the point of intake near the center of the river, before reaching the pump wells. The basin is constructed with a view of so reducing the velocity of the water that sand and grit may be precipitated and retained therein, to prevent the wear on the pumps which they now sustain from such material.

The contract price for the work is \$3,473.00.

April 15, 1893, a contract was awarded C. Prange for the extension of the conduit in bed rock in the river from the above mentioned basin to the intake crib; the construction of a section of stone masonry wall on the dock and building line in the river, the extension of Coldbrook creek culvert and making some enbankment for enlarging the storage grounds, etc.

Owing to high water in the river this work is not commenced. This work will cost \$7,000.00.

During the year there has been an extension of nearly 15 miles of water mains and 197 fire hydrants set, or a total to date of 110 miles of mains and 1,073 fire hydrants.

The total expenditure on water works for the above and for incompleted work has been \$108,170.14.

RECAPITULATION.

Street improvements	\$301,316	88
Sewers	110,337	60
Water works	108,170	14
Total	\$519,824	62
Engineering expenses not including inspection is	as follows	s :
Salaries	\$8,715	15
Transportation, repairs, etc	248	33
Total	\$9,063	48

Respectfully submitted,

H. A. COLLAR,

Engineer.

TWENTY-FIRST ANNUAL REPORT

OF THE

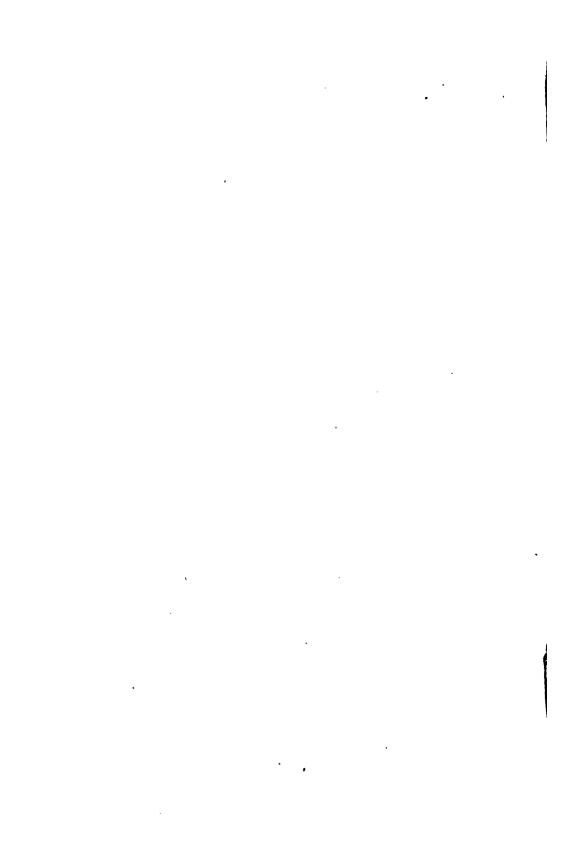
BOARD OF PUBLIC WORKS

TO THE COMMON COUNCIL OF THE

CITY OF GRAND RAPIDS,

MICHIGAN.

The Fiscal Year Ending April 30, 1894.



ANNUAL REPORT

OF THE

BOARD OF PUBLIC WORKS

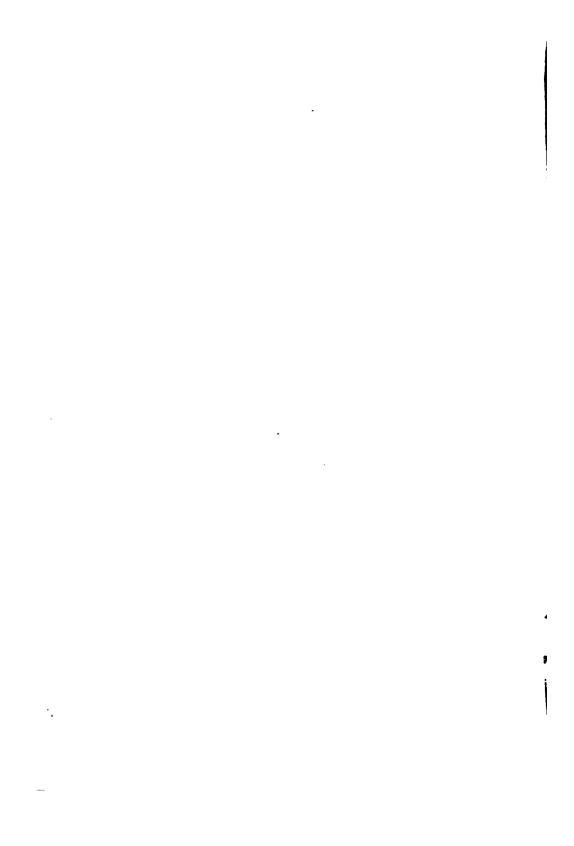
TO THE COMMON COUNCIL OF

THE CITY OF GRAND RAPIDS,

TRANSMITTING THE REPORTS OF

Secretary, City Engineer, Engineer of Pumping Station, and Inspector of Water Waste.

THE FISCAL YEAR ENDING APRIL 30, 1894.



BOARD OF PUBLIC WORKS.

FRANCIS LETELLIER, PRESIDENTTerm expires	May,	1896
E. B. FISHER, MAYOR Term expires !	Мау,	1895
A. E. WORDEN Term expires I	May,	1895
C. G. SWENSBERG Term expires !	May,	1896
L. C. STOW Term expires 1	May,	1897
J. J. McVEAN Term expires l	May,	1897

OFFICERS.

H. A. COLLAR City Engineer
GEO. M. AMES Assistant City Engineer
JAMES N. DAVIS
FRED A. TWAMLEY Secretary and Collector
THOS. J. WILLARD
E. A. BATES Engineer of Pumping Station
JOHN VAN AMBERG Supt. of Repairs and Construction
A. PER LEE



REPORT OF THE BOARD.

OFFICE OF THE BOARD OF PUBLIC WORKS

To the Honorable the Common Council of the City of Grand Rapids:

GENTLEMEN—Herewith is transmitted the annual reports of the City Engineer, Secretary of the Board of Public Works, Engineer at the Pumping Station and Water Works Inspector.

These reports give in detail the work done under the supervision of the Board of Public Works for the year ending April 30, 1894, the following being a summary:

STREETS AND ALLEYS.

	MILES.
Grade lines established	16.112
Streets improved	12.13
Total number of miles of improved streets in the city is.	140.205
Total number of miles of unimproved streets	141.303
Total number of miles of streets	281.508
SEWERS.	
Total number of miles of sewers constructed is	16.172
Making a total of miles of sewers in the city	87.332

WATER WORKS.

The subsidence basin and conduit in course of construction when report for 1892-93 was made has been completed and has effectually overcome the trouble had with sand and gravel while pumping. The conduit connecting the intake with subsidence

basin is ample to supply 20,000,000 gallons of water every twenty-four hours, running at a very slow velocity.

The Coldbrook creek culvert on the grounds of the pumping station was extended further in the river and to a point below the intake. There was also a large amount of filling done about the pumping station and new walks and driveways have been constructed.

There were laid during the year 4.43 miles of mains. The following shows the miles of mains at the close of each of the past four years:

Extent of mains April 30, 1891, 67 miles.

Extent of mains April 30, 1892, 95 miles,

Extent of mains April 30, 1893, 110 miles.

Extent of mains April 30, 1894, 114.43 miles.

The aggregate cost of the various improvements made during the year are as follows:

For streets and alleys	\$215,096	72
For sewers	108,932	64
For water works	59,734	85
Total	\$383,764	21

The total cost of the water works to date is \$1,193,739.14. The total bonded indebtedness for water works is \$887,000.

Due June, 1895	\$100,000, int. 8 per cent.	\$ 8,000
Due July, 1896	32,000, int. 8 per cent.	 2,5 60
Due Sept. 1908	150,000, int. 5 per cent.	7,500
Due May, 1909	80,000, int. 5 per cent.	4,000
Due Jan. 1912	300,000, int. $4\frac{1}{2}$ per cent	13,500
Due Oct. 1913	225,000, int. $4\frac{1}{2}$ per cent	10,125
	\$887,000	\$45,685

\$887,000	\$45,685
The income from the water works the past year was	\$71,497 66
The cost of maintenance and distribution was	38,120 95
•	
Leaving a net revenue of	\$33,376,71

The difference between the interest paid and the net revenue is \$12,308.29, and is the actual cost to the city for water for fire protection, water for public parks, city cemeteries, drinking fountains, for the flushing of sewers and the washing of streets, for which the works receive no credit.

The works also furnish free of charge water for private fire hydrants and automatic sprinklers.

The total number of gallons of water pumped the past year was 3,225,244,567 gallons, a daily average of 8,833,546 gallons, being an increase of 18½ per cent. over the previous year.

The number of services in use is 5,618, being an increase of 17 per cent over the previous year.

Taking the total number of miles of water mains in the 17 American cities having a population ranging from 60,000 to 90,000 in 1890, shows an average of 1.015 miles of mains to every 1,000 people. The miles of mains per 1,000 inhabitants in this city now is 1.43, being over 40 per cent. greater than the above average.

Respectfully submitted,

FRANCIS LETELLIER,

A. E. WORDEN.

C. G. SWENSBERG,

L. C. Stow,

J. J. McVean,

Board of Public Works.

SECRETARY'S REPORT.

Office Board of Public Works, Grand Rapids, Mich., May 1, 1894.

To the Honorable Board of Public Works:

GENTLEMEN—I respectfully submit to your honorable the following report for the year ending April 30, 1894:	body
The number of services connected with the city's works on	
the 1st of May, 1893, for which permits were issued Number of services put in the past year, for all of which per-	5525
mits were issued	926
Total Number of special connections existing May 1, 1894	6451 65
Total number of connections on May 1, 1894 Number of services now cut off	6516 898
	F.010
Number of services now open	9019
The receipts for the year have been as follows:	
From water rates\$ 69,2	72 66
·	25 00
Total income from Water Works	97 66
Miscellaneous receipts	30 54
Total for the year	28 20
Cash on hand May 1, 1893 2,3	34 55
Total\$ 80,4	62 75

Deposits have been made with the City Treasurer dyear as follows:	uring	the
To the credit of the Water Works Income Fund\$ 7	3,577	62
To the credit of the Water Works Fund	4,873	04
To the credit of the General Fund	131	25
To the credit of First and Second District Sewer		
Funds	155	00
To the credit of the Turner Street Sewer Fund	56	95
To the credit of the Tenth Ward Highway Fund	12	25
Total deposits during the year\$ 7	8.806	11
•	1,656	
Total\$ 8	0.462	75
	.,	
Receipts from May 1, 1874, the commencement of co	llectio	ons,
to May 1, 1893:		
From water rates, fines, etc\$ 52	5.327	76
	8,987	4 8
	4,344	
· · · · · · · · · · · · · · · · · · ·		
Total\$ 56	8,660	06
Receipts for the past year		
Total receipts to date \$ 64	6.788	26
	,	
Deposits from May, 1874, to May, 1893:		
To the credit of the Water Works Income Fund \$ 54	6,218	43
To the credit of various funds (per past reports)\$ 2	0,107	08
Total\$ 56	6,325	51
Deposits made the past year	8,806	11
Cash on hand to balance	1,656	

Total\$ 64	6,788	26

STATEMENT OF EXPENDITURES.

MAY 1, 1893, TO MAY 1, 1894.

CONSTRUCTION OF WATER WORKS.

1—PIPE SYSTEM.

Extensions of mains \$ Relaying of mains					
_			\$	46,439	74
2—Pumping Mac	CHINERY.				
Gaskill pumping engine\$	1,238	87			
Rebuilding south pump	758	87			
New pumping engine	60	47			
Steam pipe covering, etc	94	5 0			
-			\$	2,152	7 l
3—Buildings and	Grouni	os.			
Extending culvert and intake\$	8,666	90			
Grading and improving grounds	2,071	62			
-			\$	10,738	52
4—Subsidence	Basin.				
Constructing basin			.\$	1,738	87
5—SETTLING E	Basin.				
New sidewalk and fence			.\$	321	22

6-WATER SUPPLY.

Analysis, etc\$	25	5 0
7—METERS.		
New meters and setting\$	1,137	5 4
	62,554	<u>10</u>
Paid previous to May 1, 1893	1,131,185	04
	1,193,739	14

The total bonded indebtedness for water works is \$887,000.00

MAINTENANCE AND OPERATION OF WATER WORKS.

1—PUMPING.

Salary engineer\$	1,800	00
Salary three assistant engineers	2,800	00
Salary five firemen, one wiper, one coal passer, one		
oiler	4,140	00
Fuel	16,842	96
Repairs to pumping machinery, boilers, etc	95	00
Repairs to pumping station and shed	62	50
Supplies	1,283	16
Telephone rent	42	5 0
Street car tickets	45	00
\$	27.111	12
\$ 2—Office and Collecting.	27,111	12
2—Office and Collecting.	27,111 375	
2—Office and Collecting. One-fourth salary clerk and collector\$	·	00
2—Office and Collecting. One-fourth salary clerk and collector\$ Salary assistant collector	375	00 00
2—Office and Collecting. One-fourth salary clerk and collector\$ Salary assistant collector	375 840	00 00 00
2—Office and Collecting. One-fourth salary clerk and collector\$ Salary assistant collector Salary second assistant One-half salary third assistant	375 840 540	00 00 00 40
2—Office and Collecting. One-fourth salary clerk and collector\$ Salary assistant collector Salary second assistant	375 840 540 211	00 00 00 40 25
2—Office and Collecting. One-fourth salary clerk and collector\$ Salary assistant collector Salary second assistant One-half salary third assistant	375 840 540 211 122 164	00 00 00 40 25

3—Repairs and Inspection.

Salary of superintendent of repairs and construction 1,500 00 Salary of inspector of water waste 1,050 00 Salary of inspector of plumbers 25 31 Iron pipe 117 11 Reservoir 54 73 Hydrants 876 11 Sprinkling hydrants 3 75 Valves 79 93 Meters 1,141 78 Services 2,612 55 Tools and supplies 674 13 Barn and horses 415 27 Shop and storehouse 7 82 Blowing off 96 50 Telephone at superintendent's office 40 00 Street car tickets 45 00 RECAPITULATION. Pumping 27,111 12 Office and collecting 2,269 84 Repairs and inspection 8,739 99 Total paid for maintenance and operation 38,120 95 Paid during past year 38,120 95 Total paid for maintenance and operation to date 366,650 56 Income for the year 71,497 66 Cost of maintenance and operation 38,120 95			
Salary of inspector of plumbers 25 31 Iron pipe 117 11 Reservoir 54 73 Hydrants 876 11 Sprinkling hydrants 3 75 Valves 79 93 Meters 1,141 78 Services 2,612 55 Tools and supplies 674 13 Barn and horses 415 27 Shop and storehouse 7 82 Blowing off 96 50 Telephone at superintendent's office 40 00 Street car tickets 45 00 RECAPITULATION Pumping 27,111 12 Office and collecting 2,269 84 Repairs and inspection 8,739 99 Total paid for maintenance and operation \$ 38,120 95 Paid during past year 38,120 95 Total paid for maintenance and operation to date \$ 366,650 56 Income for the year \$ 71,497 66	Salary of superintendent of repairs and construction .\$	1,500	00
Iron pipe 117 11 Reservoir 54 73 Hydrants 876 11 Sprinkling hydrants 79 93 Meters 79 93 Meters 1,141 78 Services 2,612 55 Tools and supplies 674 13 Barn and horses 415 27 Shop and storehouse 7 82 Blowing off 96 50 Telephone at superintendent's office 40 00 Street car tickets 45 00 RECAPITULATION. Pumping \$ 27,111 12 Office and collecting 2,269 84 Repairs and inspection \$ 739 99 Total paid for maintenance and operation \$ 38,120 95 Paid for maintenance previous to May 1, 1893 \$ 328,529 61 Paid during past year 38,120 95 Total paid for maintenance and operation to date \$ 366,650 56 Income for the year \$ 71,497 66	Salary of inspector of water waste	1,050	00
Reservoir 54 73 Hydrants 876 11 Sprinkling hydrants 3 75 Valves 79 93 Meters 1,141 78 Services 2,612 55 Tools and supplies 674 13 Barn and horses 415 27 Shop and storehouse 7 82 Blowing off 96 50 Telephone at superintendent's office 40 00 Street car tickets 45 00 RECAPITULATION. Pumping 27,111 12 Office and collecting 2,269 84 Repairs and inspection 8,739 99 Total paid for maintenance and operation 38,120 95 Paid for maintenance previous to May 1, 1893 328,529 61 Paid during past year 38,120 95 Total paid for maintenance and operation to date 366,650 56 Income for the year 71,497 66	Salary of inspector of plumbers	25	31
Hydrants. 876 11 Sprinkling hydrants. 3 75 Valves. 79 93 Meters 1,141 78 Services 2,612 55 Tools and supplies 674 13 Barn and horses 415 27 Shop and storehouse 7 82 Blowing off 96 50 Telephone at superintendent's office 40 00 Street car tickets 45 00 RECAPITULATION. Pumping 2,269 84 Repairs and inspection 8,739 99 Total paid for maintenance and operation 38,120 95 Paid for maintenance previous to May 1, 1893 328,529 61 Paid during past year 38,120 95 Total paid for maintenance and operation to date 366,650 56 Income for the year 71,497 66	Iron pipe	117	11
Sprinkling hydrants 3 75 Valves 79 93 Meters 1,141 78 Services 2,612 55 Tools and supplies 674 13 Barn and horses 415 27 Shop and storehouse 7 82 Blowing off 96 50 Telephone at superintendent's office 40 00 Street car tickets 45 00 RECAPITULATION. Pumping \$ 27,111 12 Office and collecting 2,269 84 Repairs and inspection 8,739 99 Total paid for maintenance and operation 38,120 95 Paid for maintenance previous to May 1, 1893 328,529 61 Paid during past year 38,120 95 Total paid for maintenance and operation to date \$ 366,650 56 Income for the year \$ 71,497 66	Reservoir	54	73
Valves 79 93 Meters 1,141 78 Services 2,612 55 Tools and supplies 674 13 Barn and horses 415 27 Shop and storehouse 7 82 Blowing off 96 50 Telephone at superintendent's office 40 00 Street car tickets 45 00 RECAPITULATION. Pumping \$ 27,111 12 Office and collecting 2,269 84 Repairs and inspection 8,739 99 Total paid for maintenance and operation \$ 38,120 95 Paid during past year 38,120 95 Total paid for maintenance and operation to date \$ 366,650 56 Income for the year \$ 71,497 66	Hydrants	876	11
Meters 1,141 78 Services 2,612 55 Tools and supplies 674 13 Barn and horses 415 27 Shop and storehouse 7 82 Blowing off 96 50 Telephone at superintendent's office 40 00 Street car tickets 45 00 RECAPITULATION. Pumping 27,111 12 Office and collecting 2,269 84 Repairs and inspection 8,739 99 Total paid for maintenance and operation \$ 38,120 95 Paid during past year 38,120 95 Total paid for maintenance and operation to date \$ 366,650 56 Income for the year \$ 71,497 66	Sprinkling hydrants	3	75
Services 2,612 55 Tools and supplies 674 13 Barn and horses 415 27 Shop and storehouse 7 82 Blowing off 96 50 Telephone at superintendent's office 40 00 Street car tickets 45 00 RECAPITULATION. Pumping 27,111 12 Office and collecting 2,269 84 Repairs and inspection 8,739 99 Total paid for maintenance and operation \$ 38,120 95 Paid during past year 38,120 95 Total paid for maintenance and operation to date \$ 366,650 56 Income for the year \$ 71,497 66	Valves	79	93
Tools and supplies 674 13 Barn and horses 415 27 Shop and storehouse 7 82 Blowing off 96 50 Telephone at superintendent's office 40 00 Street car tickets 45 00 RECAPITULATION. Pumping \$ 27,111 12 Office and collecting 2,269 84 Repairs and inspection 8,739 99 Total paid for maintenance and operation \$ 38,120 95 Paid during past year 38,120 95 Total paid for maintenance and operation to date \$ 366,650 56 Income for the year \$ 71,497 66	Meters	1,141	78
Barn and horses 415 27 Shop and storehouse 7 82 Blowing off 96 50 Telephone at superintendent's office 40 00 Street car tickets 45 00 RECAPITULATION. Pumping \$ 27,111 12 Office and collecting 2,269 84 Repairs and inspection 8,739 99 Total paid for maintenance and operation \$ 38,120 95 Paid during past year 38,120 95 Total paid for maintenance and operation to date \$ 366,650 56 Income for the year \$ 71,497 66	Services	2,612	55
Shop and storehouse 7 82 Blowing off 96 50 Telephone at superintendent's office 40 00 Street car tickets 45 00 RECAPITULATION. Pumping \$ 27,111 12 Office and collecting 2,269 84 Repairs and inspection 8,739 99 Total paid for maintenance and operation \$ 38,120 95 Paid for maintenance previous to May 1, 1893 \$ 328,529 61 Paid during past year 38,120 95 Total paid for maintenance and operation to date \$ 366,650 56 Income for the year \$ 71,497 66	Tools and supplies	674	13
Blowing off. 96 50 Telephone at superintendent's office 40 00 Street car tickets. 45 00 RECAPITULATION. Pumping \$ 27,111 12 Office and collecting 2,269 84 Repairs and inspection 8,739 99 Total paid for maintenance and operation \$ 38,120 95 Paid for maintenance previous to May 1, 1893 \$ 328,529 61 Paid during past year 38,120 95 Total paid for maintenance and operation to date \$ 366,650 56 Income for the year \$ 71,497 66	Barn and horses	415	27
Telephone at superintendent's office 40 00 Street car tickets 45 00 \$ 8,739 99 RECAPITULATION. Pumping \$ 27,111 12 Office and collecting 2,269 84 Repairs and inspection 8,739 99 Total paid for maintenance and operation \$ 38,120 95 Paid for maintenance previous to May 1, 1893 \$ 328,529 61 Paid during past year 38,120 95 Total paid for maintenance and operation to date \$ 366,650 56 Income for the year \$ 71,497 66	Shop and storehouse	7	82
Street car tickets.	Blowing off	96	5 0
RECAPITULATION. Pumping	Telephone at superintendent's office	40	00
RECAPITULATION. Pumping \$ 27,111 12 Office and collecting 2,269 84 Repairs and inspection 8,739 99 Total paid for maintenance and operation \$ 38,120 95 Paid for maintenance previous to May 1, 1893 \$ 328,529 61 Paid during past year 38,120 95 Total paid for maintenance and operation to date \$ 366,650 56 Income for the year \$ 71,497 66	Street car tickets	45	00
RECAPITULATION. Pumping \$ 27,111 12 Office and collecting 2,269 84 Repairs and inspection 8,739 99 Total paid for maintenance and operation \$ 38,120 95 Paid for maintenance previous to May 1, 1893 \$ 328,529 61 Paid during past year 38,120 95 Total paid for maintenance and operation to date \$ 366,650 56 Income for the year \$ 71,497 66	-		
Pumping \$ 27,111 12 Office and collecting 2,269 84 Repairs and inspection 8,739 99 Total paid for maintenance and operation \$ 38,120 95 Paid for maintenance previous to May 1, 1893 \$ 328,529 61 Paid during past year 38,120 95 Total paid for maintenance and operation to date \$ 366,650 56 Income for the year \$ 71,497 66	<u></u>	8,739	99
Office and collecting 2,269 84 Repairs and inspection 8,739 99 Total paid for maintenance and operation 38,120 95 Paid for maintenance previous to May 1, 1893 328,529 61 Paid during past year 38,120 95 Total paid for maintenance and operation to date \$ 366,650 56 Income for the year \$ 71,497 66	RECAPITULATION.		
Office and collecting 2,269 84 Repairs and inspection 8,739 99 Total paid for maintenance and operation 38,120 95 Paid for maintenance previous to May 1, 1893 328,529 61 Paid during past year 38,120 95 Total paid for maintenance and operation to date \$ 366,650 56 Income for the year \$ 71,497 66	Pumping	27,111	12
Repairs and inspection 8,739 99 Total paid for maintenance and operation 38,120 95 Paid for maintenance previous to May 1, 1893 328,529 61 Paid during past year 38,120 95 Total paid for maintenance and operation to date \$ 366,650 56 Income for the year \$ 71,497 66		· · · · · · · · · · · · · · · · · · ·	
Paid for maintenance previous to May 1, 1893 \$ 328,529 61 Paid during past year	**	8,739	99
Paid during past year 38,120 95 Total paid for maintenance and operation to date \$ 366,650 56 Income for the year \$ 71,497 66	Total paid for maintenance and operation\$	38,120	95
Total paid for maintenance and operation to date	Paid for maintenance previous to May 1, 1893 \$	328,529	61
date\$ 366,650 56 Income for the year\$ 71,497 66	Paid during past year	38,120	95
		366,650	56
	Income for the year	71 497	66
The state of the s			
Excess of receipts over expenditures\$ 33,376 71	<u></u>		

Of the 505 meters last reported, 40 of them have been found unfit for further service and are not accounted for. The balance, with the 59 meters received during the year, makes 524 meters owned by the city, as follows;

NAMES OF METERS.	Running.	In Shop.	Total.
Worthington	288	58	841
Crown	52	4	56
Ball & Fitts Rotary	31	1	32
Ball & Fitts Duplex	35	1	86
Ball & Fits Piston.	8	7	15
Hersey	80	3	83
Nach	6		6
Тhошреоп	4	1	5
Total	454	70	524

Six leaks on water mains have been repaired during the year. Four hundred and nineteen permits to connect with the public sewers were issued during the year.

Respectfully submitted.

FRED A. TWAMLEY,

Secretary and Collector.

ENGINEER OF PUMPING STATION REPORT.

GRAND RAPIDS WATER WORKS
PUMPING STATION.

To the Honorable Board of Fublic Works:

GENTLEMEN—I have the honor to submit the engineer's report for the year ending April 30, 1894.

The following table shows the number of gallons of water pumped, the amount of coal consumed for pumping, raising steam, heating building and running electric light engine, and the cost of same. The average daily consumption of water for the year has been 8,833,546 gallons, against an average the previous year of 7,199,364½ gallons, an increase of 18 5-10 per cent. Total cost of coal to pump 1,000,000 gallons of water into the high and low systems \$4.75, against a cost the previous year of \$4.64, an increase of two per cent., caused by the Gordon & Maxwell pump, which is very expensive to run, and an increase of 15c. a ton on coal this year.

Total number of gallons of water pumped into stand pipe for the year ending April 30, 1894, was 887,839,831 gallons, while the amount pumped the previous year was 717,061,213 gallons, an increase of 19 per cent. in the high system.

Respectfully submitted,

E. A. BATES, Engineer Pumping Station.

May H M June 81 744 15 2 June 90 717 15 2 July 81 728 00 2 Aagust 81 727 15 2 September 80 686 15 2 November 81 705 15 2 January 81 785 15 2 Warch 82 689 80 2 Warch 81 742 15 2 Abril 80 687 25 2	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	1,060,656 1,187,999 1,584,218		Month.	Gallons Pumped per Day.	of Coal Con- sumed per Month.	Coal Con- sumed per Day for Pumping.
81 728 00 81 728 00 80 696 15 80 696 15 80 688 15 81 785 15 81 782 80 82 669 80 83 742 15 80 689 20		1,187,999	34,214	255,895,682	8,125,667	706,079	22,841
31 728 00 31 727 15 30 696 15 31 705 15 31 785 15 31 782 30 31 742 15 30 699 30	-	1,584,218	36,000	259,613,342	8,653,778	744,680	24,821
81 727 15 80 696 15 81 705 15 81 785 15 81 782 80 82 669 80 80 689 80 81 742 15 80 689 80			51,108	313,245,261	10,104,686	940,530	80,889
80 696 15 81 705 15 80 688 15 81 735 15 81 782 80 81 742 15 80 689 20 80 687 25		1,532,024	49,097	824,580 171	10.468,714	1,084,988	33,386
81 705 15 80 689 15 81 735 15 81 782 80 89 80 80 809 25 80 809 25		1,404,992	46,883	262, 507, 867	8,760,295	829,045	27,684
80 688 15 81 785 15 81 792 80 82 669 80 81 742 15 80 687 25		1,258,480	40,531	259,061,410	8,857,465	842,181	27,165
31 735 15 81 782 30 28 669 30 81 742 15 80 687 25	22 28	1,262,967	44,079	286,381,295	7.879.076	787,570	28,252
81 792 80 28 669 80 81 742 15 80 667 25	83 43	1,217,255	39,286	264,883,868	8,544,641	818,875	26,428
31 742 15 30 697 25	28 57	1,850,873	48,560	269,278,240	8,666,39	887,392	27,012
81 742 15 80 697 25	75 75 78	1,262,604	45,057	256,174,155	9,149,07	752,860	28,888
30 697 25	25 25	1,294,104	41,100	266,952,841	8,611,382	772,500	24,911
	23 15	1,188,771	39,625	260,400,485	8,680,014	770,860	25.678
865 8601 10 28	282 41	15,701,848	508,465	8,225,244,567	106,021,186	9,887,566	828,585
General Average per Month 716 46 2	7 88	1,808,487	42,872	268,603,714	8,835,099	819,797	26,961
General Average per Day 28 24	:	48,658	:	8,833,546		26,815	

NOTE-Coal for raising steam, heating building and ranning electric light engine included in this report.

INSPECTOR'S REPORT.

Office of Board of Public Works, CRAND RAPIDS, MICH., May 1, 1894.

To the Honorable Board of Public Works:

GENTLEMEN—I respectfully submit the following report for the year ending April 30, 1894:

Total number of premises supplied with city water (not metered) 6,271.

Total number of fixtures 17,164 as follows:

Baths	1,125
Closets	4,791
Wash basins	1,103
Sink faucets	2,749
Urinals	79
Hydrants and sill cocks	6,743
Miscellaneous	574

During the year there have been 5,430 inspections made with the following result:

Number of leaks (and waste) discovered	571
Number of notices to water consumers	495
Number of notices to plumbers and drain layers	109
Number of services shut off	109
Number of services turned on	

The following table shows the number, kind and location of water fixtures:

WARDS	Baths	Water Closets	Wash Basins	Sink Faucets	Urinals	Hydrants and Sill Cocks	Miscellaneous
First and Twelfth	73	895	71	282	11	744	48
Second, Fourth and Fifth	271	1171	288	761	24	1681	116
Third, Tenth and Eleventh	615	2180	852	1166	7	2637	280
Sixth and Seventh	102	678	76	295	8	1107	55
Eighth and Ninth	57	334	56	198	8	569	28
School and Engine Houses	7	33	60	47	21	55	47
Totals	1125	4791	1103	2749	79	6748	574
Grand Total							17164

Respectfully submitted,

A. PER LEE, Inspector.

CITY ENGINEER'S REPORT.

Office Board of Public Works, Grand Rapids, Mich, May 1, 1894.

To the Honorable Board of Public Works:

GENTLEMEN—I have the honor to submit herewith my eleventh annual report of public work done under your direction for year ending April 30, 1894:

STREETS.

Grade lines for streets and alleys to the extent of 15.71 miles have been approved and adopted and 0.402 miles have been reestablished, as is shown by the following table, which gives the length and termini of such grade lines:

NAME OF STREET.	FROM	то	Length in feet,
Ashland avenue	Madison	Page	77:
Bradford avenue	East Fulcon	Hope	90
Brown avenue	South Division	Buchanan	125
Butterworth avenue	South Lane ave nue	West city line	4394
Bekius court	Grandville avenue	Westward	310
Canal street	Sweet	Knapp avenue	264
Campau street	Lyon	Louis	56
Center street	Ann	Knapp	132
(?hubb street	Letellier	Olive	83
Chicago avenue	Hall	Stevens	1090
Cody place	First avenue	Alley	33
Columbia avenue	Madison	Page	77
Curve street	Grandville avenue	Godfrey avenue	66

NAME OF STREET.	FROM	то	Length in feet.
Cuming avenue	Grand avenue	North East	598
Dayton	South Lane avenue	West	1294
Righth avenue	Jefferson Avenue	Madison avenue	1251
Euclid avenue	Hall	Home avenue	681
Fremont	Twelfth	West Leonard	617
Hamilton	Eleventh	West Leonard	1267
Hovey	South Lane avenue	West	1282
Howland	('anal	Taylor	1292
Innes avenue	Grand avenue	North East	596
Knapp averue	Canal	East city line	5468
L-ske	Giddings avenue	Rural	1076
Letellier	South Front	West of Olive	584
Lyon	Canal	Grand river	585
Lyon	Grand avenue	North East	584
Logan	Giddings avenue	Raral	1076
Major's court	Fifth avenue	South	442
Marion	Batterworth avenue	Sibley	8407
McConnell	Buchanan	South Ionia	598
Morgan	South East	Seymour	1229
Olive	Earle	Letellier	337
Orchard place	Pleasant avenue	Southward	298
Page	North Union	Eastward	1202
Pennsylvania avenue	Madison	Page	775
Phillips	Hall	Stevens	1108
Plainfield avenue	East Leonard	Sweet	3565
Portland avenue	Madison	Page	775
Prospect avenue	West Bridge	Southward	935
Ramona	Kalamazoo avenue	Seymour	1087
Randolph	Hall	Stevens	1093
Ransom	East Fulton	Lyon	1418
Seymour	Adams	U. S. G. avenue	2418
Silas avenue	East Fulton	Hope avenue	905
South Waterloo	Bartlett	South terminus	6023
South Lane	Butterworth avenue	Sibley	3202
Stevens	South Division	North and south 14 line, sec 1.	2600
Straight	West Wealthy avenue	L. S. & M. S. R.R.	362
Third	Lincoln	Valley avenue	886

NAME OF STREET.	FROM	то	Length in feet.
Twelfth	Muskegon	West	1226
Underhill	Fifth avenue	Hall	2695
U. S G. avenue	South East	Seymour	1226
Watson	South Lane avenue	Weet	1293
Watrous avenue	Ann	Hickory	990
Waters	North	Nason	2586
Wellington place	Backeye	South East	505
Widdicomb	Twelfth	West Leonard	617
ı			ı

ALLEYS.

BETWEEN.	FROM	то	Length in feet.
"D" and Broadway	Third	Northward	233
Bartlett and Goodrich	Finney	Grandville avenue	435
Julia and Oak avenue	Grand avenue	North Union	511
Gold and S. Jefferson	Butterworth avenue	Watson	621
First avenue and Pleasant	Cody place	South Division	178
Crescent avenue and Lyon	Kent	Ottawa	2:20
Kent and Ottawa	Lyon	North	325
Summer and Mt. Vernon	Allen	Shawmut avenue	400
North Prospect and North } North Lafayette }	Fountain	Lyon	697

GRADE LINES RE-ESTABLISHED.

NAME OF STREET.	FROM	то	Length in feet.
Ames	Brigge	North avenue	421
Briggs place	Ames	Qaimby	108
Broadway	Hamilton	D., G. H. & M. R'y	525
Calder	Oaker	East Fulton	950
Earle	South Front	L. S. & M. S. R'y	739
East Leonard	North Union	North East extended	1296
Yourth	Valley avenue	West city line	1859
Houseman	East Bridge	Fountain	1750
Innes avenue	North Diamond	North East	1254
I-land	Almy	Ellsworth	528
Lake avenue	South Faller	Station 94	1950
Logan	South East	South Fuller	2548
Lyon	Grand avenue	North Union	604
North Pine	Eleventh	West Leonard	1254
North Prospect	Bradford	Matilda	650
South Diamond	Logan	Wealthy avenue	608
West Bridge	Gartield avenue	West city line	2778
Worden	Henry	South Union	594
Alley between Indiana and Gunnison	Butterworth avenue	Park avenue	39 8
Alley between Butterworth (avenue and Park avenue (Indiana	Above alley	416

Streets to the extent of 11.77 miles have been improved during the year and alleys to the extent of 0.36 miles, as shown by the following table. Many of the streets, however, are reimprovements.

The cost of the work above noted is, for streets, \$212,096.72; for alleys, \$3,000.00; or total cost of \$215,096.72.

GBADED AND PAVED WITH ASPHALT SHEET PAVEMENT.

mad the			enerh in		COST		SUCHA LETTINOS DO TLATA
SIREEL	E CONTRACTOR OF THE CONTRACTOR	0	Feet	Contract Price	Estimated Incidentals	Total Cost	NAME OF CONTRACTORS
*South College avenue Wealthy avenue Mills	Wealthy avenue	Mills.	1,468	\$13,848 60	£231 40	\$14,080 00	\$14,080 00 Warren-Scharf Asphalt Pav's Co.
	BEGRADI	BEGRADED AND PAYED WITH BRICK ON CONCRETE FOUNDATION	H BRICK	ON CONC	RETE FOU	NDATION.	
*Campau Pearl Louis	Pearl	Louis	828	83,725 00	8365 00	\$4,090 00	Hayden & Owen.
	REGRADED 1	REGRADED AND PAVED WITH CEDAR BLOCKS ON GRAVEL FOUNDATION	EDAR BI	OCKS ON	GRAVEL F	OUNDATIC	JN.
*Scribner Weet Bridge	Weet Bridge	Webster		7,070 881,000 00		831,736 72	8736 72 831.736 72 J. McDermott.
	REGRADED AN	REGRADED AND PAVED WITH CEDAR BLOCKS ON CONCRETE FOUNDATION	DAR BLC	CKS ON C	ONCRETE	FOUNDAT	ION.
*North Division Lyon	Lyon	Monroe	1,213	\$8,800 00	00 0088	\$8,600 00	C. Prange.
*Bostwick Lyon	Lyon	Park	1,020	4,849 00	251 00	5,100 00	C. Prange.
*1sland	South Division	South Ionia	572	5,845 00	125 00	+ 5,800 00	Matthewson & Kloote.
						\$19,500 00	

† Cost reduced by change of plans while work was in progress. * Improvements include upright stone curbs.

GRADED, GRAVELED AND GUTTERS PAVED.

					COST		
STREET	FROM	TO	Length in				NAME OF CONTRACTORS
			reet.	Contract Price	Estimated Incidentals	Total Cost	
*Buckeye	South East	South Diamond	1,241	\$4,235 00	\$245 00	03 087,48	J. Powers.
Umatilla	Madison avenue	South Union	1,254	2,200 00	300 00	2,400 00	L. Schneider.
*Hollister	Cherry	Backeye	080	1,641 00	109 00	1,750 00	J. Powers.
*Wallen	НаЛ	Ninth avenue	1,254	8,112 90	217 10	8,330 00	A. Vetting & Bon.
*Island	Almy	Ellsworth avenue	9	1,600 00	1,170 00	2,770 00	Grand Rapide Macadam Pav. Co.
*Calder		Cherry	1,246	3,089 48	1,220 07	4,810 00	Grand Rapids Macadam Pav. Co.
*Hall	Grandville avenue	Kalamazoo avenue	9,967	26,488 05	856 95	28,850 00	Peterson & Skeels.
*North East	Fountain	Імев	8,568	11,657 30	492 70	12,150 00	Grand Rapide Macadam Pav. Co.
Cheetnut	Oakland avenue	Grandville avenue	667	840 10	109 90	00 026	Grand Rapids Macadam Pav. Co.
*Highland avenue	Jefferson avenue	South Union	2,572	5,687 00	818 00	6,000 00	F. Vander Plow.
*Charles	Sherman	Thomas	285	1,870 00	110 00	1,480 00	Vanderveen & Pop.
*Dwight avenue	East Fulton	Гаке втеппе	779	1,900 CO	150 00	2 050 00	Hoedmans & Ulberg.
Атов	North avenue	Brigge Place	124	K24 00	00 98	00 018,1	L. Schneider.
Briggs Place	Ашее	Quimby	901	205 00	45 00	250 00	A. & P. Vetting.
Fernando	North avenue	North College avenue	282	762 80	117 70	00 088	H Schoenwald.
*Paris avenue	Thomas	Fifth avenue	280	1,445 00	155 00	1,600 00	Rens & Vanderveen.
*Frank	Canal	Taylor	98	974 00	128 00	1,100 00	Rens & Hogendyk.
*Sherman	*Sherman Bouth East East City Line	East City Line	5,191	15,800 00	00 007	15,700 00	Rens & Hogendyk

* Improvements include upright stone ourbs.

GRADED, GRAVELED AND GUITTERS PAVED-CONTINUED.

NAME OF CONTRACTORS		\$4,000 (0' H, Wagemacher.	1,500 00 P. Marema.	2,850 00 Hoedemans & Ulberg.	7,900 00 H. Wagemacher.	8,800 00 Visser & Spaaman.	770 00 A. Vetting & Bon.	1,970 00 Rens & Vanderveen.	1,080 00 A. Vetting.	2,500 00 Wagemacher & Myer.	550 00 J. B. Hoey.	2,850 00 J. Collins, Jr.	1,530 00 J. Colline, Jr.
	d Total Cost												1,5
COST	Estimated Incidentals	\$225 00	125 50	210 00	325 00	908	103 40	120 00	111 00	125 00	00 06	Private Contract	3
	Contract Estimated Price Incidentals	\$3,775 00	1,374 50	2.140 00	7,575 00	8,491 00	666 60	1,850 00	P-19 00	2 875 00	00 09+	Private	3
Length in	Feet	1,247	288	1,:62	2,543	2,545	420	629	292	1,267	412	1,2,1	1.258
		South Union	Fifth avenue	West Leonard	South Faller	South Faller	Washington	Wealthy avenue	Washington	West Leonard	Water Works Reserv.	South Union	South Union
	r KOM	South East	Thomas	Eleventh West Leonard	South East	South East	State	*Eureka avenue Buckey e	State	Eleventh	Newberry	South East	Worden South Erst South Union
	SIKEET	*Bates	*South College avenue	Quarry	*Logan	*Lake	*South Prospect	*Eureka avenue	*Madison avenue	Hamilton	*Livingston	Prince	Worden

* Improvements include upright stone curbs.

GRADED AND GRAVELED.

Gunnison	Butterworth avenue	Gunnison Batterworth avenue Veto 2,107 \$3,750 00 \$150 00 \$3,000 00 J. MoDermott.	2,107	\$3,750 00	\$150 00	\$3,900 00	J. MoDermott.
South Lane avenue Sibley West Fulton 1.282 6,288 00 102 00 6,890 00 M. Tennis.	Sibley	West Fulton	1,282	6,288 00	102 00	6,890 00	M. Tennis.
West Wealthy avenue.	River avenue	Grand River	1,560	5,438 00	802 00	8,240 00	West Weslthy avenue. River avenue Grand River 1,540 5,638 00 802 00 6,240 00 Sullivan, Higgins & Lehnen.
				- 1	1	1	

ALLEY AND COURT IMPROVEMENTS. GRADED AND GRAVELED.

Č	MOLEVOOL		Length in		COST		CHOCKET STREET, MO THE STATE
	CALION		Feet	Contract	Estimated	Total Cost	NAME OF CONTRACTORS
Alley between Second and Third . Fremont North Lane ave.	Fremontia North Union	North Lane ave.	362	\$116 00 181 00	00 59	\$180 00	W. D. Hembling Rens & Hogendyk.
	GRADED AND PAVED WITH CEDAR BLOCKS ON CONCRETE FOUNDATION.	VED WITH CEI	AR BLOC	KS ON CO	NCRETE FO	OUNDATIC	N.
Alley in rear of Court House Kent Oltawa	Kent	Ottawa	230	\$810 00	\$110 00	\$920 00	L. Schneider.
	GRADED AND PAYED WITH CEDAR BLOUKS ON GRAVEL FOUNDATION	AVED WITH CE	DAR BLO	KS ON G	RAVEL FO	UNDATIO	7
Alley between Kent and Ottawn	Lyon	{ Alley rear of }	325	\$685 00	8115 00	00 0088	J. Powers.
	GRAD	GRADED AND GRAVELED WITH PAVED GUTTERS.	ELED WI'	TH PAVED	GUTTERS		
Thompson court First avenue Pleasant	First avenue	Pleasant	187	8794 00	\$106 00	00 0063	Rens & Vander Veen,

* Improvements include upright stone curbs.

The extent The following table shows street improvements under contract but not complete. of this work is 10.85 miles and will cost \$197,445.

IMPROVEMENTS OF STREETS UNDER CONTRACT BUT NOT COMPLETE.

	FROM	O _L	Length in		COST		NAME OF CONTRACTORS
			Fect	Contract Price	Estimated Incidentals	Total Cost	•
North Prospect	Bradford	Cedar	1,247.0	\$ 2,850 00	\$200 00	8 8,850 00	J. Powers.
	West Bridge	Southward	935.0	1.800 00	100 00	1,900 60	J. J. Rens.
	West Wealthy avenue.	West Wealthy avenue. L. S. & M. S. R. R	425.0	1,094 00	106 00	1,200 00	E. A. Connelly.
	Fifth avenue	Thomas	591.0	1,159 00	121 60	00 018,1	Vanderveen & Pop.
	Plainfield avenue	East street extended .	4,750.0	16,666 00	484 00	17,100 00	A. & P. Vetting.
	West Leonard West	Greenwood cemetery.	1,327.0	2,876 98	193 02	8,070 00	Wm. Maynard.
		West city line	1,277.0	1,925 (0	105 00	2,030 00	J. McDermott.
Іппев вуепив	North East	North Diamond	1,254.0	8,100 00	250 60	8,350 00	J. McDermott.
Ноизепляп	East Bridge	Fountain	1,750.0	5,300 00	850 (0	5,620 00	A. Prange.
	West Leonard	Southward	870.0	1,141 70	508 30	1,350 00	Hodemans & Ulberg.
Paris avenue	Wealthy avenue	Mills	1,468.0	18,700 00	130 00	18,830 00	Warren Scharf Asphalt Pav's Co.
Park avenue	South Lane avenue	John Ball Park	2,615.0	4,275 00	345 00	4.620 00	Wm. Powers.
	Butterworth avenue	West Fulton	1,920.0	4,770 00	230 00	2,000 00	J. Роwегв.
	Indiana	Valley avenue	2,584.0	10,000 00	200 00	10,200 00	J. McDermott.
Oakdale avenue	Madison avenue	Kalamazoo avenue	4,668.0	10,200 00	200 000	10,700 00	Peterson & Skeels.
Fremout	Eleventh	Walker avenue	1,183.0	1,683 00	157 00	1,790 00	Hodemans & Ulberg.
Fourth	West Side ditch	West city line	2,705.0	9,361 80	438 20	00 008'6	Higgins & Lehnen.
•	Divinion	Jefferson svenne	0.798	6,490 00	210 00	8,700 00	Coleman & Hallwood.
1			-	•	•	-	

IMPROVEMENTS OF STREETS UNDER CONTRACT BUT NOT COMPLETED - CONTINUED.

_
TO
South Division
Seventh at extended.
John Ball Park
Allen
West Division
Fountain
Годап
Sherman
Valley City cemetery
Fifth avenue
D. G. H. & M. R'y
Valley аvеппе
Lyon
West Fultor
West city line
Latellier
Letellier
Stevens
Wealthy avenue
North Lafayette North Union

The mileage of streets has increased a little over 20 miles, by platting and condemnation, during the past year, the amount of which being 281,553.

Their condition as regards improvement is as follows:

	MILES.
Graded and paved with asphalt	1.993
Graded and paved with brick	1.207
Graded and macadamized	0.336
Graded and paved with tar composition	0.095
Graded and paved with cedar on concrete	2.585
Graded and paved with cedar on plank	0.528
Graded and paved with cobble stone on gravel	1.151
Graded and paved with cedar on gravel	4.881
Graded and paved with wood and stone on gravel	3.389
Graded, graveled and gutters paved	86.518
Graded and graveled	31.102
Graded	6. 465
Unimproved	141.303
Total Miles	281.553

SEWERS.

An important piece of work during this year has been the extension of the (so called) Prescott street sewer, from the westerly terminus of the brick portion of said sewer near the westerly line of Grandville avenue, westward across private property, (the right of way for such sewer having first been obtained by the aldermen of the ward), to South Waterloo street and thence southwesterly in said last mentioned street to a point south of the line of Straight street extended south across the river. In connection with such sewer extension was the construction of a relief sewer for the sewer in South Ionia street north of said Prescott street by cutting it off at said streets last mentioned, and extending from thence west to the point of juncture referred to above. This relief sewer takes all the sewage and storm water east of South Division street, which covers a large area and saves the strain upon the old Spring street sewer, which has bursted on two occasions at times of floods.

The other sewer work was lateral work, which furnishes sewerage to a large portion of the city.

Work on the plan for a complete system of sewerage is progressing. Some more field work being required before the maps can be completed. This work will be carried along as rapidly as possible, at the same time keeping contractors supplied with the necessary work staked to keep them employed.

The table following gives the name of the respective streets in which sewers have been laid, the length, size, kind and cost thereof.

TABLE OF SEWERS, GIVING LOCATION, MATERIAL, SIZE, LENGTH AND ('OST,

	CONTRACTOR	J. Owens.	J. O'Hara.	L. Sohneider.	J. O'Hara.	J. O'Hara.				J. O'Hara.					760 00 J. DeBrine & Son.
	Total Cost	8 850 00	1,370 00	8,400 00	45 0 00	00 088 880				5,480 00					
cosr	Estimated Inciden- tals and Rock Ex- cavations	\$ 121 00	184 00	259 00	95 81	129 00				807 87					124 00
	Contract Price	729 00	1,016 00	8,141 00	854 10	691 00				5,122 63					989 00
	Length in Feet	200	1,303	1,081 880 285	245	200	242	256 256 256 256 256 256 256 256 256 256	273	24.8	8	3	791	30 2	99
agizas	No Catch F	:	•	00	:	:	-	<u>:</u>	:_	:	:	:	:	:	61
59	No. Manho	+	-	20	83	i	*	4	4	*	89	တ	œ	∞	7
	SIZE AND KIND	12-in. glazed pipe 9-in. glazed pipe	12-in. glazed pipe	20x80, brick, egg shaped 15-in. glazed pipe	9-in. glazed pipe	12-in. glazed pipe 9-in. glazed pipe	12-in. glazed pipe	20-in. glazed pipe	12-in. glazed pipe	{ 12-in glazed pipe	9-in. glazed pipe	9-in. glazed pipe	9-in. glazed pipe	9-in. glazed pipe	9-in. glazed pipe
	LUCATION OF SEWER	From 50 ft. west of Valley City Cem-	Park avenue { From John Ball Park to weet side }	124	{ From 100 ft. north of Dale avenue } to Palmer avenue	From 30 ft. west of North Union to	From Center to Fernando	From Portland avenue to N. Union	From Portland avenue to N. Union { 9.4n. glassed pipe	From Brenner Court to Madison	From Page to Madison	From Page to Madison	From Page to Madison	From Page to Madison	Jefferson avenue { From n. line Sycamore to Pleasant }
	STREET	Crawford	Park avenue	Madison avenue	Wartrous avenue	Curtis	North avenue	Madison	Раде	North Union	Columbia avenue	Ashland avenue	Pennsylvanía ave	Portland avenue	Jefferson avenue

2,200 00 Bens & Vander Veen.	940 00 Klonte & Heerschap.	830 00 J. Collins, Jr.	560 00 J. Owens.	700 00 Wm. Powers.	600 00 Wm. Powers.	480 00 Wm. Powers.	1,470 00 A. Rens.	700 00 Klaste &	Heerschap.	530 00 J. Colline, Jr.	2,070 00 A. Mustie.	580 00 J. Owens.		780 00 A. Mustie. -		1,500 U. J. VOIKBIR.	1,920 00 J. Volkers.		L'OIU UU E. ECHORE WAIG.	530 00 Drieburg & Rece.
	8	8	88	88	- 8 6 82	- 16				_									7 8	
00 932	181	101	107	105	700	8	246 79		3	105 00	170 00	116 00		130 00	96	#6 017 	225 81		<u> </u>	118 00
1,945 00	803 00	729 00	453 00	594 85	499 12	387 09	1,223 21	2	8 66	425 00	1,900 00	444 00		650 00	9	1,383 10	1,694 19	8	8	412 00
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	173 986	978	1,234	248	984	285	1,337	297	110	201	861 1,926 }	986	200	261	1,297	1,191	1,890 }	689	571 }	28
-	-	s.	:	:	:		i	:	:	_ <u>i</u>	2	:	:			:	:	_	-	i
23	*	80	7	တ	8	27	7	27		2	œ	အ	2	83		<b>x</b> 0	<b>x</b> 0	83	83	~
20x30, brick, egg shaped 26x39, brick, egg shaped	{ 9-in. glazed pipe	9-in. glazed pipe	9-in. glazed pipe	12-in. glazed pipe 9-in. glazed pipe	9-in. glazed pipe	9-in. glaz-d pipe	9-in gluzed pipe	12-in glazed pipe	18 in. glazed pipe	9-in, glazed pipe	{ 9 in. glazed pipe	9-in. glazed pipe	9.in. glazed pipe	9-in. glaz d pipe	12-in. glazed pipe	9-in. glazed pipe	12-in. glazed pipe	9-in. glazed pipe	9-in. glazed pipe	9-in. glazed pipe
Wealthy avenue   Fr m east line of South Division to South Jonia	From Stevens to Hall	From Tenth avenue to Hall	From North to Broadway	From 100 ft, west of Jefferson ave.	From west line N. Prospect east-   ward 864 fect	From Thomas to Sherman	From Eleventh to West Leonard	From John to East Fulton	From Jefferson avenue to Barclay	From 94 ft. west of South Division   to South Lonis	From Straight to west side ditch	{ From 50 ft. north of West Leonard } to Eleventh	From 50 ft. s. of Orchard to Lake av	From 100 ft. east of Congress to }	From 50 ft. w. of So. Diamond to	From 50 west of routh Fuller to South Dismond.	From South Fuller to South East	From Curtis to Carr er	From 40 ft. s. of Curtis to Carrier	Fourth avenue { From 50 ft. east of Oakland nve. }
Wealthy avenue	South Ionia	South Ionia	Elizabeth	Ноте втепие	East Fulton	Charles	Turner	Barclay	East Fulton	Ноте вуепие	Park avenue	Quarry	Congress	Orchard	4	Togge	Lake Street	North College ave.	Christ	Fourth avenue

TABLE OF SEWERS, GIVING LOCATION, MATERIAL, SIZE, LENGTH AND COST.—CONTINUED.

	CONTRACTOR	J. Owens.	А. Верв.	J. Volkers.		J. Неегворар.	J. O'Hars.	J. O'Hara.	J. DeBrine.	Rens & Vander Veen.	A. Bens.	Kloote & Heerschap.		J. O'Hara.	590 00 Zank & Wissman.
	Total Cost	\$ 810 00	250 00	520 00		1,130 00	790 00	980 00	900 008	900 00	2,470 00	230 00	520 00	00 099	00 069
COST	Estimated Incidentals and Rock Excartions	\$ 70 00	62 73	8		216 00	145 10	144 65	125 00	110 00	211 10	82 00	109 00	98 17	128 00
	Contract	% 240 00	187 28	<b>428</b>		814 00	06 779	715 85	763 00	00 089	2,256 90	165 00	411 00	556 83	467 00
	Length in Feet	870	20	(009	200	1,810	4 <del>4</del> 4 748 €	1,568	280	570	808 878	228	ž	200	286 6
snizas	No. Catch I	:	i	•	:	:	-	:	:	:	:	:	•	:	<u>:</u>
50	No. Manhol	8	-		:	4	•	2	<b>∞</b>	ø	-6	-	83	~	+
	SIZE AND KIND	9-in. glazed pipe	P.in. glazed pip		9-in. glazed pipe	12-in. glazed pipe	9-in. glazed pipe	12-in. glazed pipe	9-in. glazed pipe	12-in. glazed pipe	12-in. glazed pipe	12-in. glazed pipe	P.fn. glazed pipe	12-in. glazed pipe	9-in. glazed pipe
	LOCATION OF SEWER	From 57 ft. west of Stocking to   Michigan	From 50 ft. north of Third to Fourth	From 50 f. e. of N. Union e. 250 ft.   south and east across private   ground in alley	From s. line Innes' Add. to Julia	From John Ball Park to west side ditch	From 100 ft, west of Plainfield ave. to North Colt avenue	From Indian Mill Creek to North et	From Lyon to south line Fountain.	Seconstruction from 100 ft. North	Reconstruction from Lyon to Mon-	From Cherry to Williams	From 25 ft. n. of Fisher to Buokeye)  From 25 ft. south of Fisher to Wealthy avenue	From 98 ft. west of South Ionia to	From Stocking to Fremont
- ! !	SIREET	Blymeyer court	Pettibone	Oak avenue	Grand avenue	West Fulton	Palmer avenue	Broadway	Bostwick	Капеош	North Division	South Ionia	Eureka avenue	Sixth avenue	Third

Terrace avenue	From Fifth ave. to Highland ave   12-in. glazed pipe	in. glazed pipe	7		763   1.278 00 994	152 00	1,430 00	152 00 1,480 00 J. Meyer.
	From Bank to alley west of Canal   12-	12-in. glazed pfpe	- <u>:</u> - <u>:</u>	69				
	From Squires alley to Erie 15-	15-in. glazed pipe	.:	278	982 00	108 00	1,040 00	M. Tennis.
	From Bank to alley west of Canal. 15-	15-in. glazed pipe	<u>:</u> :	8				
	From 418 ft. south of Hall to Hall. 12-	12-in. glazed pipe	2	461	Pri	Pri vate Con tract	tract	J. DeBrine.
	From Grandville ave. west 380 feet.   9-i	9-in. glazed pipe	.:	9	00 667	141 00	00 070	Drieburg & Rees.
	From Butterworth avenue to Earle. 12-	12-ın. glazed pipe	<u>:</u> :	168				
	From Straight to Olive 12.	12-in. glazed pipe	9	788	1,858 81	181 19	1,540 00	J. O'Hara.
	From Earle to Letellier 12	12-in. glazed pipe		387				
	From Springfield avenue to Seventh 9-1	9-in. glazed pipe	es es	673	479 00	111 00	280 60	H. Schoenwald.
	From Thomas to Mills 9-1	9-in. glazed pipe	_: - <b>:</b>	421	208 00	00 48	300 00	Kloot
	From Butterworth to s. line Earle 12.	12-in. glazed pipe	4 . 1	200				Heerschap.
	From Earle to Letellier 12.	12-in. glazed pipe		887	678 00	187 00	810 00	J. B. Hoey.
Wealthy avenue	From e. line Finney to S. Waterloo { 12.	9-in. glazed pipe	*	681 586	789 00	161 00	0) 098	J. O'Hara.
	From Finney to South Waterloo 9-1	P-In. glazed pipe		772	514 00	116 00	00 089	Hoffert & Miller.
	From 150 ft. East Finney to South   9.5	9.in. glazed pipe	es -	782	485 00	105 00	280 (10)	J. DeBrine.
	From 50 ft. south of Wealthy avenue   12 to Fifth avenue   15   15	9-iu. glazed pipe 12-in. glazed pipe 15-in. glazed pipe	9	948 1.288 1.288	2,460 00	00 078	2,800 00	J. Collins, Jr.
- • -	From So. Fuller to So. Diamond	9-in. glazed pipe.		1,631 581	2,011 00	389 00	2,350 00	Rens & Vander Veen.
	From West Bridge to 50 ft. south }	9-in. glazed pipe		204	1,086 00	144 00	1,230 00	J. Collins, Jr.
	:	{ 12-in. glazed pipe	9	881				
	From 26 ft. east of North avenue to North College avenue removed. Prom North Union to North College avenue.	9-in. glazed pipe		1,270	74.1	132 18	1,580 00	M. Tennis.

TABLE OF SEWERS, (HIVING LOCATION, MATERIAL, SIZE, LENGTH AND COST.—CONTINUED.

	CONTRACTOR	5	Kloote & Heerschap		J. & H. DeBrine.	Hoedemans		A. Rens.		M. Tennis.		J. Myer.	L. Schneider.	440 00 Ј. Оwens.
	Total Cost	9	9 2,740 W		2,680 00	700 00	380 00	300 00		32,800 00		780 00	1,200 00	440 00
COST	Estimated Inciden- tals and Rock Ex- cavations	9	33 363		295 00	129 03	62 00	93 60		5,300 00		128 00	172 00	128 00
 	Contract Price	9	# CO 004.25 #		2,365 00	570 97	318 00	206 40		1,742 } 27,500 00		901 00	1,028 00	817 00
11	Length in Feet	888 402	325	250	95.55.55 95.55.55 95.55.55	400 ≥ 870 ≥	<del>\$6</del>	370	1,510	1,742 }	1,848	324 314 <	\$55 418	578
snize(	No. Catch F		<u>:</u>	≟	=	_		<u>:</u>		co		*		<u>:</u>
cs	lodasM .oV	<u> </u>	•	<u>:</u>		60	63	_	_ :	13	_ <u>:</u>	~	••	89
	SIZE AND KIND	12-in. glazed pipe 15-in. glazed pipe 20-in. glazed pipe	20-in. glazed pipe	20-in. glazed pipe	20-in. glazed pipe 18-in. glazed pipe 15-in. glazed pipe 12-in. glazed pipe	12-in, glazed pipe 9-in. glazed pipe	9-in. glazed pipe	9-in. glazed pipe	60-in. brick circular	72-in. brick circular	81-in. brick circular	{ 12-in. glazed pipe,	12.in. glazed pipe 9.in. glazed pipe 9-in. glazed pipe.	9-in. glazed pipe
	LOCATION OF SEWER	From Weelthy avenue to Baxter	From South Diamond to Dolbee	From Baxter to Sherman	From n. line Williams southward	From 50 ft. north of Lake avenue to	From 100 ft. south of East Bridge \ to south line Crescent avenue	From 50 ft. n. of Madison to Quimby	From South Ionia to Grandville av.	From Grandville avenue to South	From 450 ft. south of Wealthy ave-	From N. Pine to Fremont	From 100 feet east of Fremont to Alpine avenue.	From 100 feet north of Home ave.
	STREET	South Diamond	Baxter	Dolbee	South Waterloo	Dwight avenue	Капвот	Perry	Prescott	Extension	South Waterloo	First	Tenth	Eaclid avenue

North Diamond	North Dismond From Helen ave, to E. Fulton	9-in. glazed pipe 2		:	906	880 00	00 08		120 00   L. Bohneider.
(Эгөөп	From 100 feet west of Jefferson   avenue to Central avenue	9-in. glazed pipe	-	<u>:</u>	<b>88</b>	165 00	88	230 00	Rens &
Fremont	From Eleventh to Walker avenue	9-in. glazed pipe	- <del>-</del>	~	7388	1,000 68	150 87	1,160 00	M. Tennis.
Third	From N. Pine to Fremont	{ 12-in. glazed pipe }		-8	414	730 93	119 07	920 00	M. Tennis.
Earle	From S. Lane ave. to Marion	9-in. glazed pipe	- <del>-</del>	· :	98 		3		;
Marion	From Earle to Park avenue	9-in. glazed pipe	 	-:	98 	8	90 00	00 000	J. Volkere.
Williams	From alley blk. 15, Ellsworth ave.	9-in. glazed pipe	<del></del>	න න	641	257 00	116 00	710 00	E. A. Connelly.
Third	From Beech avenue to point 167 feet west of Broadway	12-in. glased pipe		<b>*</b>	1,050 }	1,073 00	167 00	1,240 00	M. Tennis.
West Division	From 65 feet south of Veto to W. }	9-in. glazed pipe		_ :	259	140 00	99	300 00	Ј. Оwеве.
Prince	From 50 feet tust of Henry to 8.	8-in. glazed pine.				200		Contract	Private Contract I Colline I-
	Union So reet west of Henry to B		<u>:</u> :	<u>:</u>		5		Contract	o. Comme, or.
Worden	From S. East to S. Union	12-in. glazed pipe		- 2 	838 884 884	8 <b>27</b> 00	Private	Contract	Private Contract J. Collins, Jr.
West Falton	From John Ball Park to West Side ditch.	12-in. glazed pipe			1,310	914 00	216 00	1,180 00	J. Heerschap.
Bartlett	From 150 feet east of Finney to S. Waterloo	9-in. glazed pipe		 	782	988	105 00	280 00	J. DeBrine.
Goodrich	From Finnsy to S. Waterloo	9-in. glazed pipe		-2	77.5	214 00	116 00	630 00	Hoffert & Miller.
Wealthy avenue	From Finney to S. Waterloo { 9-in glazed pipe {12-in glazed pipe	9-in. glazed pipe	-		529	789 00	161 00	00 098	J. O'Hara.

SEWERS UNDER CONTRACT BUT NOT COMPLETE.

		_				
STREETS	LOCATION OF SEWER	SIZE AND KIND	Contract	Estimated inci- dentals and Rock excava- tions	Testal Cost.	CONTRACTOR
onth Faller	From Lillian avenue to Sherman		1,475 00	\$ 185 00	* 1,660 00	J, J. Rens.
xth avenue	From South Ionia to South Division	9-inch glazed pipe	572 46	127 54	200 00	700 00 A. Bouterse.
akdale avenue	From Madiaun avenue to Paris avenue 12-inch glazed pipe	12-inch glazed pipe	771 51	128 49	00 000	900 00 J. Verberg.
efferson avenue	From Hall to G. R., L. & D. B. B 9-inch glazed pipe	9-inch glazed pipe	744 00	156 00	00 006	900 00 Mustie & Rens.
)npham	From Dolbee to South East 9-inch glazed pipe	9-inch glized pipe	00 9#8	114 00	00 009	600 00 Mustle & Rens.
)avton	From Straight to West 1.744 44	9 & 12-in. glazed pipe	1.744 44	202	1.950 00	1.950 00 J. J. Beng.

In the foregoing tables of work completed, there were constructed 1.094 miles of brick sewers and 15.078 miles of pipe sewers. In connection with such sewers there were constructed 283 man-holes and 123 catch-basins. The cost of this work has been \$108,932.64.

The system of sewerage comprises sewers in extent and material as noted below:

	MILES.
Brick sewers	22.139
Glazed pipe sewers	64.322
Cement pipe	0.100
Wood sewers	0.610
Wrought iron pipe	0.161
Total	87.332

#### WATER WORKS.

The extension of mains during the year has not been very great, although several short lines have been laid.

The pump's cylinders being cut quite rapidly by the amount of sand drawn in through the old conduit it was necessary to resort to the expedient of constructing a subsidence basin, which was referred to in last report; also, a larger conduit therefrom to the point of intake, in the middle of the river.

The subsidence basin was excavated in the rock bottom of the river to a depth below the bottom of the pump-well, with walls built from said river bottom to a point above the surface of the ground about the station. The basin is built with a partition wall through the center longitudinally, so that one side might be cut out of service whenever it became necessary to remove sediment from it, by closing gates, leaving the other side open for use. The basin is covered with a roof to prevent dust or foreign material from getting into the water, as well as to protect the public against injury.

The basin was calculated to dimensions admitting a flow of 20,000,000 gallons daily, with water moving so slowly as to allow all sand to precipitate.

Hauser, Hayden & Owen constructed the basin on an award by the board on Jan. 7, 1893, some extra work increased the cost a small amount, making the cost to be in total \$3,740.67; \$1,738.82 having been paid this year.

A larger conduit than the old one was essential, therefore plans were adopted for excavating a new one which should extend from the subsidence basin to the intake aforementioned. sides of the conduit were lined up with masonry and an arch of stone work built; the arch being covered with concrete masonry. This conduit has an area of cross-section of twenty-five square feet, length of same being 274 feet. In connection with this work was the extension of the Coldbrook creek culvert, now extending across the pump house grounds to the river, across the ground to be filled west of the old bank. This extension was about 200 feet The river rock bed was cleared off, stone abutments built thereon upon a footing of concrete which extended entirely across The last 100 feet toward the river is plastered with the work. cement mortar one inch thick, making the bottom where it passes over the new conduit and for a considerable distance each way. as tight as a cistern. This arrangement places the outfall of the creek culvert below the conduit, in the rapid current of the river. In addition to these items mentioned there was a large quantity of earth deposited between the retaining wall and the subsidence basin and around the culvert.

This work was done by C. Prange for \$8,449.90, the contract being awarded April 15, 1893, as mentioned in last report.

Improvements of the grounds consisting of grading and sodding on the south and east sides of the station was done by day work and the cost amounted to \$207.62. Cement walks were built around on south and east sides of the buildings, also walks to the building on each front, together with brick paved driveways to coal shed and at west side of grounds. This work was done by the Artificial Stone Co. for \$1,251.28, on a contract awarded

May 27, 1893. An embankment back of station and coal sheds to the extent of 6005 cubic yards has been made in the old river bed, which has cost \$480.40.

In January, 1892, a Gaskill pump was purchased by the city at a cost of \$48,000. Owing to the quantity of sand drawn through the old intake, the work was not wholly satisfactory, but since the new intake and subsidence basin have been in use the pump has given satisfactory work. Through the occurrence of small failures, for which the company proposed to become responsible, they have settled for \$45,000.

Sundry other small items of expense in connection with the water works, I have no note of; they are reported by the clerk. Forty-six thousand four hundred thirty-nine dollars and seventy-four cents have been expended for laying and lowering mains. Itemized, the expense is as follows:

Subsidence basin (paid this year)\$	1,738	82
Extending culvert, etc	8,499	90
Walks and brick drives	1.251	<b>5</b> 0
Embankment rear of building	480	<b>4</b> 0
Gaskill pump	1,238	87
Grading and sodding	207	<b>62</b>
Cost of mains 4	16,439	74
Total\$5	59,734	85

#### RECAPITULATION.

Street and alley improvements\$215,096 72	
Sewers	
Water works 59,734 85	
Total\$383,764 21	
The cost for work unfinished is:	
For streets\$197,445 00	
For sewers 6,710 00	

....\$204,155 00

The expense for engineering, not including inspection,	has
been:	
For salaries\$8,80	3 70
For transportation and repairs 24	0 18
Total\$9,04	3 88
Or a slight amount greater than .0108 per cent of the cothe work completed.	st of

Respectfully submitted,

H. A. COLLAR.

Engineer.

# LIST OF WATER MAINS LAID SINCE APRIL 30, 1890.

### EAST SIDE WATER MAINS, LOW SERVICE.

STREET	FROM	то	Diameter in inches	Length in feet
Ann	Canal	Plainfield avenue	4	2932
В	Grandville avenue	Godfrey avenue	8	882
Bostwick	Fountain	Park	4	400
Canal	Trowbridge	Fairbanks	8	578
Canal	Pumping station	Ottawa	30	283
Canal	Sweet	Ann	8	1420
Case avenue	Fifth avenue	Home avenue	6	3294
Coldbrook	Ottawa	North Ionia	20	280
Cody place	First avenue	Southward	4	419
Crawford	Madison avenue	Valley City cemetery	4	1028
Dale avenue	Canal	North Coit avenue	4	1562
Erie	Bank	Eastward	4	103
Eignth avenue	South Ionia	Agnew avenue	4	456
Euclid avenue	Hall	Home avenue	4	669
Fair	South Division	Jefferson avenue	4	938
First avenue	Lagrave	Jefferson avenue	4	320
Fourth avenue	Grandville avenue	Oakland avenue	4	690
Frank,	Canal	Taylor	4	561
Forrest	Madison	Page	4	649
Fourth avenue	Grandville avenue	Hilton	4	594
Gilbert	Madison avenue	Valley City cemetery	6	1033
Grandville avenue	Bartlett	Hall	12	3275
Grandville avenue	Hall	Shamrock place	8	404
Griggs avenue	South Division	Buchanan	6	1855
Green	South Division	Jefferson avenue	4	932
Godfrey avenue	В	Second avenue	8	2323

### EAST SIDE WATER MAINS, LOW SERVICE.-CONTINUED.

STREET	FROM	то	Diameter in inches	Length in feet
Hall	Grandville avenue	Madison avenue	8	6334
Hall	Madison	South Union	4	1294
Home avenue	Jefferson avenue	South Ionia	4	1587
Howland	Canal	Taylor	4	550
Henrietta	Madison	Page	4	649
King	Grandville avenue	Westward	4	658
La Belle	South Division	South Ionia	4	661
Madison avenue	Highland avenue	G. R., L. & D. R. R	6	2553
Martha	Grandville avenue	Godfrey avenue	4	760
Miller	South Ionia	Buchanan	4	631
North Coit	Sweet	Ann	6	1356
North Ionia	Coldbroook	Mason	20	1417
Oakdale avenue	Madison avenue	Paris avenue	6	1000
Oakland avenue	В	Wealthy avenue	6	3465
Palmer avenue	Canal	Plainfield avenue	6	2650
Plainfield avenue	Sweet	Ann	8	1587
Pleasant	South Division	South Lafayette	4	1564
Park	North Division	Bostwick	4	786
Prescott	Buchanan	Grandville avenue	6	743
Reed	Madison	Page	4	649
Rumsey	Hilton	Grandville avenue	4	594
Salem avenue	Hall	Home avenue	4	667
Second avenue	Oakland avenue	Eastward	1	514
Seventh agenge	Agnew avenue	South Ionia	4	456
Sixth avenue	Agnew avenue	South Ionia	4	456
South Division	Hall	Burton avenue	8	5033
South Ionia	Hall	La Belle	6	<b>¥38</b>
South Prospect	Washington	Cherry	4	678
South Spring	Oakes	Wealthy avenue	6	1837
South Waterloo	East Fulton	Wealthy avenue	В	8021
State	Waverly place	South Prospect		846
Tenth avenue	South Division	South Ionia	1	660
Terrace avenue	Fifth avenue	Hall	8	2654
Travis avenue	Canal	Plainfield avenue	4	2197
Twelfth avenue	South Division.	Buchanan	4	1353

## EAST SIDE WATER MAINS, LOW SERVICE.—CONTINUED.

		0.5	3.5
ison avenue	South Union	4	1305
ө	Cherry	4	437
th Lafayette	Jefferson avenue	4	726
Fulton	Northward	4	170
worth avenue	Finney	4	588
	eth Lafayette	th Lafayette Jefferson avenue	South Union

### WEST SIDE WATER MAINS, LOW SERVICE.

STREET	FROM	то	Diameter in inches	Length in feet
Alpine avenue	Seventh	North	12	5904
Alabama	West Bridge	Second	6	769
Allen	Alley ea-t of	Mount Vernon	4	151
Allen	Alley east of	Summer	4	151
Barkers court	West Bridge	Firet	4	349
Beech avenue	Third	Fourth	4	396
Bowery	8 raight	South Pine	4	1651
Broadway	Webster	North	10	772
Butterworth avenue	Hogadone	River avenue	8	270
Butterworth avenue	South Lane avenue	near Ives avenue	8	1724
Cadwell	West Bridge	North	4	217
Chatham	Straight	Marian	4	1962
Chubb	Earle	Letellier	4	408
Court	West Bridge	Shawmut	6	1611
Crosby	Alpine	Tamarack	4	1299
Davis	Seventh	Eleventh	4	1324
Dayton	S'raight	South Lane avenue	4	1322
Earle	Olive	Straight	4	815
Eleventh	Broadway	Muskegon	6.	13:6
First	McReynolds	Stocking	4	497
First	North Pine	west of Lincoln	4	867
Fifth	Broadway	Michigan	4	2159
Fourth	Fremont	North Pine	6	793
Fredrick	West Leonard	Crosby	4	700
Fremont	West Bridge	Walker avenue	8	2745
Fremont	Walker avenne	Eleventh	6	1252
Gelock alley	Butterworth avenue	Earle	4	497
Hemlock	Straight	east ward	6	4:0
Hogadone avenue	Butterworth avenue	southward	4	760
Hovey	Straight	Gunnison	4	1004
Indiana	Butterworth avenue	West Falton.	12	1608
Jackson	Straight	West Division	4	1802
Jackson.	South Pine	M crian	4	332
Jennette.	Seventh	Ninth	6	613
		***********************		0.0

# WEST SIDE WATER MAINS, LOW SERVICE.—CONTINUED.

STREET	FROM	то	Diameter in inches	Length in feet
Jennette	Twelfth	West Leonard	6	684
Letellier	South Front	Olive	6	491
Lincoln	West Bridge	Fourth	4	1589
Maple avenue	Third	Fourth	4	390
Muskegon	Ninth	Twelfth	4	1280
Muskegon	Seventh	Ninth	6	650
Muskegon	Twelfth	West Leonard	6	670
McReynolds	Seventh	Eleventh	4	1857
Nagold	Stocking	Fremont	4	758
Ninth	Broadway	Muskegon	6	1380
Ninth	Alpine	Fremont	4	876
North	Alpine	eust ward	8	1073
North Pine	Second	Fourth	6	70
North Front	West Leonard	Webster	6	180
Olive	Letellier	Earle	4	880
Park avenue	Gunnison	South Lane	4	318
Pettibone	West Bridge	Fourth	4	11.50
Quarry	Eleventh	Myrtle	6	2638
River avenue	Butterworth avenue	southward	4	958
Second	Stocking	Lincoln	4	250
Scribner	West Bridge	Eighth	6	277
Scribner	Eighth	Webster	8	425
Shawmut avenue	Winter	West Division	6	69
Sibley	Straight	Marion	4	201
Sixth	Broadway	Stocking	4	2600
South Front	West Bridge	West Fulton	12	2640
South Lane	Dayton	Butterworth avenue	6	987
Springfield avenue	Stocking	Fremont	4	680
Straight	Butterworth avenue	Hemlock	в	839
Summer	West Bridge	near West Fulton	4	2298
Tenth	Alpine	Fremont	4	87
Third	Stocking	Lincoln	4	272
Valley avenue	West Bridge	northward	в	3
Veto	Jefferson	West Division	4	30
Walker avenue	remont	Powers	8	132

### WEST SIDE WATER MAINS, LOW SERVICE.—CONTINUED.

STREET	FROM	то	Diameter in inches	Length
Webster	North Front	Scribner	8	266
West	Walker avenue	West Leonard	4	2411
West Bridge	West Side ditch	Valley avenue	8	511
West Division	West Bridge	Shawmut	6	1619
West Fulton	Gunnison	John Ball Park	8	2 <b>9</b> 50
West Leonard	Alpine	Greenwood cemetery	8	4431
Alley between Court and Mt. Vernon	Allen	Shawmut	4	466
Alley between Mt. Vernon and Summer	Allen	Shawmut	4	466

# EAST SIDE WATER MAINS, HIGH SERVICE.

STREET	FROM	то	Diameter in inches	Length in feet
Bates	South Union	South East	4	1818
Benson	Crescent avenue	D., G. H. & M. R. R	4	1021
Bradburn	Fifth avenue	Thomas	4	657
Buckeye	South East	South Diamond	4	1282
Cedar	Clancy	North Coit avenue	12	1611
Charles	Wealthy avenue	Logan	4	642
Charles	Sherman	Thomas	4	660
Cherry	South East	Lake avenue	8	1710
Coit avenue	Bradford	Fairbanks	6	770
Carrier	North College avenue	North Union	4	650
Diamond	Fountain	Lake avenge	6	1941
Dauham	Dolbee	South East	4	1021
Dwight avenue	Orchard	Lake avenue	4	400
East Bridge	North Union	Grand avenue	8	668
East Fulton	North East	Faller	10	2778
East Fulton	Prospect	College avenue	6	826
East Leonard	North Lafayette	North Union	6	1920
Kureka avenue	Buckeye	Wealthy avenue	4	72
Ethel avenue	Wealthy avenue	Logan	6	676
Fountain	Grand avenue	North East	6	750
Fifth avenue	Madison avenue	South College avenue	8	657
Fifth avenue	South College avenue	South Union	16	657
Fifth avenue	South Union	South East	12	1813
Grand avenue	Fountain	East Fulton	4	759
Grand avenue	East Bridge	North line Highland park	4	1218
Hall	South East	Kalamazoo avenue	16	1079
Hastings	Clancy	North College avenue	4	164
Henry	Thomas	Fifth avenue	6	658
Henry	Worden	Northward	4	140
Highland	Jefferson avenue	South College avenue	4	1668
Holland	Fountain	East Fulton	4	800
Hollister	Cherry	Buckeye	4	724
James	South of Logan	Sherman	4	502
Kennedy	Henry	South Union	4	658
Lake avenue	South East	Kellogg	6	1633

# EAST SIDE WATER MAINS, HIGH SERVICE.—CONTINUED.

STREET	FROM	то	Diameter in inches	Length in feet
Lake avenue	South Fuller	Kellogg	8	1170
Lake avenue	South Fuller	Wealthy avenue	6	2430
Lake	South East	South Fuller	6	2597
Logan	South East	South Fuller	6	2594
Logan	South East	South Union	4	1816
Madison avenue	Fifth avenue	Highland avenue	6	1823
Mechanio	North Union	Grand avenue	4	558
North College avenue	Hastings	Trowbridge	6	509
North College avenue	Cedar	Flat	6	2179
North College avenue	Cedar	East Leonard	12	1824
North ('ollege avenue	East Leonard	Quimby	8	1764
North East	East Fulton	northward	4	437
North avenue	Madison	northward	6	496
North Lafayette	Trowbridge	Beadford	6	1144
North Prospect	Hastings	Fairbanks	4	1189
Prince	South East	South Union	4	1312
Prospact place	South East	Hastings	4	696
Paris avenue	Mills	Fifth avenue	4	1060
Quimby	North avenue	North College avenue	4	662
Richard terrace	Lake aveuue	Wealthy avenue	4	687
Sherman	South Union	South East	4	1315
Sherman	South East	Gelock	6	1272
South East	East Fulton	Wealthy avenue	1	2473
South East	Wealthy avenue	Woodworth avenue	1	3907
South East	Woodworth avenue	Hall	16	1271
South College avenue	Logan	Fifth avenue		1970
lrving place	South Lafayette	South Prospect	1	286
South Prospect	Cherry	Wealthy avenue	1	1255
South Union	Thomas	1	1	656
South Union	Fifth avenue	Worden	1	830
Wealthy avenue	South East	South Fuller	12	2606
Wealthy avenue	South Fuller	Lake avenue	10	2124
Wealthy avenue	Lake avenue	School		212
Wells	Buckeye	Wealthy avenue	4	624
Wellington place	Buckeye	South East		561

## EAST SIDE WATER MAINS, HIGH SERVICE .- CONTINUED.

LOCATION OF MAIN	Diameter in inches	Length in feet
Woodlawn avenue, from Madison to South Union	4	1294
Worden, from South East to South Union		1312
Force main (ne **) pump house to Canal		63
Force main (new) pump house to Canal		96
Blow off, Canal to river and pump well	4	106
Hydrant connections	6	4968

# HYDRANTS LOCATED SINCE APRIL 30, 1890.

### EAST SIDE.

STREET.	LOCATION.
Ann	Northwest corner Center
Ann	
Benson	
Bostwick	Southwest corner Fountain
Buckeye	
Buckeye	Northwest corner Warren
Buchanan	Southeast corner McConnell
Canal	
Canal	
Canal	West side, near pump house
Canal	West side, opposite Dale
Canal	West side, opposite Travis avenue
Canal	
Canal	
Carrier	
Case avenue	Northwest corner Home avenue, produced
Cedar	Northwest corner North Lafayette
Cedar	
Cedar	
Cedar	Northwest corner North College avenue
Charles	Southwest corner Sherman
Charles	Northwest corner Thomas
Cherry	North side, opposite Hollister
Cherry	North side, opposite Warren
Coit avenue	
Cody place	South end of said place
Crawford	300 feet west of Valley City cemetery
Dale	Northwest corner Center
Diamond	West side, opposite Hermitage
Diamond	West side, opposite Laura avenue

### EAST SIDE HYDRANTS .- CONTINUED.

	CATION.
Diamond West side,	
Diamond	hwest corner Fountain
DunhamNo	orthwest corner Dolbee
DwightWest	side, opposite Orchard
East BridgeNo	rthwest corner Benson
East BridgeNorthwes	t corner Grand avenue
East FultonNorth	side, opposite Dwight
East Fulton	thwest corner Holland
East FultonNort	hwest corner Diamond
East FultonNorth	side, opposite Dennis
East Fulton	ide, opposite Fitzhugh
Kast Fulton	st corner North Faller
East FultonNorth side, mi	dway east of Prospect
East LeonardNorthwee	st corner North avenue
East LeonardNorthwe	st corner North Union
Ethel avenue	orthwest corner Logan
Eureka avenue	st side, opposite Fisher
Erle	orthwest corner Bank
Eighth avenue	est side Agnew avenue
FairNorth side	opposite Vilas avenue
FairNorthwest c	orner Jefferson averue
First avenueNorthwest c	orner Jefferson avenue
Fourth avenue	.Northeast corner New
Fifth avenueNorth	west corner Bradburn
Fifth avenueNorthwest corne	South College avenue
Fountain North sid	e, opposite North East
Grand avenueWest	side, opposite Harvey
Grand avenueWest side, nor	th line Highland Park
Grandville avenue	ite Engine House No. 5
Grandville avenueNort	hwest corner Goodrich
Grandville avenueNorthwest	corner Wealthy avenue
Grandville avenue	Northwest corner King
Grandville avenue	side, opposite Prescott
Grandville avenueNorthwest	corner Second avenue
Grandville avenue	opposite Third avenue
Grandville avenueNorthwee	t corner Fourth avenue
Grandville avenueSout	hwest corner Chestuut
Grandville avenue	orthwest corner Laurel
Grandville avenue	est corner Fifth avenue

### EAST SIDE HYDRANTS .- CONTINUED.

STREET.	LOCATION.
Grandville avenue	Northwest corner A
Grandville avenue	Northwest corner B
Grandville avenue	
Grandville avenue	Northwest corner Hall
Grandville avenue	West side, opposite Shamrock place
Gilbert	North side, 200 feet west of Valley City Cometery
Grigge avenue	North side, midway west of South Division
Griggs avenue	
Godfrey avenue	
Godfrey avenue	
Godfrey avenue	Northwest corner Fifth avenue
Godfrey avenue	West side, midway north of Fifth avenue
Godfrey avenue	
Godfrey avenue	
Godfrey avenue	West side, opposite Second avenue
Hall	
Hall	
Hall	
Hall	North side, opposite Lumber
Hall	North side, opposite Steele
Hail	Northwest corner Wallen
Hall	Northwest corner Buchanan
Hall	
Hall	
Hall	Northwest corner Terrace avenue
Hall	
Hall	•
Hall	
Hall	
Hali	
Hall	
Hall	
Hastings	<u> </u>
Henry	
Henry	
Henrietta	
Highland avenue	
Home avenue	
Home avenue	

# EAST SIDE HYDRANTS.—CONTINUED.

STREET. LOCATION.
HollandSouthwest corner Fountain
James
KingNorth side at west end
Lake avenue
Lake avenue Northwest corn-r Bradford avenue
Lake avenue
Lake avenueNorthwest corner Carlton avenue
Lake avenue
Lake avenue
Lake avenue Northeast corner Wealthy avenue
Madison avenueWest side, opposite Worden
Madison avenue
Madison avenue
Madison avenue
Madison avenueNorthweet corner Highland avenue
Madison avenue
Madison avenue
Madison avenue West side, opposite Crawford
Madison avenueWest side, opposite Gilbert
Madison avenueWest side, opposite Adams
Madison avenue
Madison avenue
Martha Northwest corner Underhill
Martha West side of Godfrey avenue
Mechanic Northeast corner North Union
Mechanic
MillerNortheast corner Buchanan
North avenueNorthwest corner Quimby
North ('cit avenue
North Coit avenue
North Coit avenue
North Coit avenue

### EAST SIDE HYDRANTS.—CONTINUED.

STREET.	LOCATION.
North College avenue	
North College avenue	West side, opposite Bissell
North College avenue	
North College avenue	Northwest corner Pleasant avenue
North College avenue	
North College avenue	Northwest corner Walnut
North College avenue	Northwest corner Vine
North College avenue	
North College avenue	Northwest corner Barnett
North College avenue	Northwest corner East Leonard
North College avenue	
North College avenue	Northwest corner Fernando
North College avenue	Northwest corner Madison
North College avenue	Northeast corner Quimby
North Ionia	Northeast corner Walbridge
North Lafayette	Northwest corner Fairbanks
North Prospect	Northwest corner Trowbridge
North Prespect	Northwest corner Fairbanks
Oakland avenue	•
Oakland avenue	
Oakland avenue	
Oakland avenue	,
Oakland avenue	
Oakland avenue	
Oskland avenue	
Oakdale avenue	· • •
Oakdale avenue	
Oakdale avenue	
Palmer avenue	
Palmer avenue	
Park	
Park	
Park	Northwest corner Ransom
Paris avenue	
Plainfield avenue	
Plainfield avenue	
Plainfield avenue	
Prescott	· •
Prescott	

# EAST SIDE HYDRANTS .- CONTINUED.

STREET.	LOCATION.
Prescott	North side, 50 feet west Buchanan
Prescott	
Prescott	North side, 550 feet west Buchanan
Prince	
Prince	Northeast corner South Union
Seventh avenue	_
Sixth avenue	West side Agnew avenue
Sherman	Northwest corner Dolbee
Sherman	Northwest corner Gelock
South Division	Northwest corner Home avenue
South Division	
South Division	Northwest corner Stevens
South Division	
South Division	
South Division	
South Divison	
South Division	
South Division	Northwest corner Ridge avenue
South Division	Northwest corner Brown avenue
South Division	Northwest corner Griggs avenue
South Division	
South Division	
South Division	
South College avenue	Northwest corner Mills
South East	
South East	Northwest corner Bates
South East	Northwest corner Fifth
South East	Northwest corner Worden
South East	
South East	
Bouth East	
South East	
South East	
South Ionia	
South Ionia	

## EAST SIDE HYDRANTS.—CONTINUED.

STREET.	LOCATION,
South Prospect	Northwest corner Irving place
South Spring	Southwest corner Oakes
South Spring	Northwest corner Cherry
South Spring	Northwest corner Williams
South Spring	Northwest corner Bartlett
South Spring	Northwest corner Goodrich
South Spring	
South Waterloo	West side, opposite Oakes
South Waterloo	
South Waterloo	
South Waterloo	
South Union	
South Union	Northwest corner Fifth avenue
State	
State	Northwest corner South Prospect
Terrace avenue	Midway south Fifth avenue
Terrane avenue	Northwest corner Eighth avenue
Terrace avenue	Midway south of Eighth avenue
Terrace avenue	
Travis avenue	
Travis avenue	Northwest corner Wartrous
Twelfth avenue	Northwest corner Buchanan
UmatillaNo	rthwest corner South College avenue, produced
Umatilla	
Waverly place	
Washington Wealthy avenue	
Wealthy avenue	
Wealthy avenue	
Wealthy avenue	• •
Wealthy avenue	
Wealthy avenue	North side, opposite Ethel avenue
Wealthy avenue	Northwest corner School
Woodlawn avenue	Northwest corner South College avenue
Woodlawn avenue	
Worden	
Worden	Northeast corner South Union

### WEST SIDE HYDRANTS.

STREET.	LOCATION.
Alabama	Northwest corner First
Alpine avenue	Northwest corner Eighth
Alpine avenue	Northwest corner Ninth
Alpine avenue	Northwest corner Tenth
Alpine avenue	
Alpine avenue	
Alpine avenue	Northwest corner Crosby
Alpine avenue	
Alpine avenue	660 feet north of Myrtle
Alpine avenue	Northwest corner North
Berkers court	Southwest corner First
Bowery	Northwest corner Indiana
Bowery	North side, 160 feet west of Tusch's alley
Bowery	Northwest corner South Lane avenue
Broadway	West side, midway North and Webster
Broad way	Southwest corner North
Butterworth avenue	Northwest corner West
Butterworth avenue	
Chatham	
Chatham	North side, 180 west of Tusch's alley
Chatham	Northwest corner South Lane avenue
Cha'ham	West side Marion, opposite Chatham
Court	Northwest corner Bowery
Court	Northwest corner Chatham
Court	Northwest corner Allen
Croaby	. North side, 250 feet west of Alpine avenue
Crosby	. North side, 650 feet west of Alpine avenue
Crosby	North side, 1000 feet west of Alpine avenue
Crosby	Northeast corner Tamarack
Davis	Northwest corner Ninth
Davis	Northwest corner Eleventh
Dayton	Northwest corner Straight
Dayton	Northwest corner Indiana
Dayton	Northwest corner Delony
Dayton	Northwest corner Gunnison
Earle	North side, opposite Chubb
Earle	North side, opposite Olive
Earle	Northwest corner West Broadway

# WEST SIDE HYDRANTS.—CONTINUED.

STREET.	LOCATION.
	Northwest corner Hamilton
Eleventh	Northwest corner Quarry
Eleventh	North side, near C. & W. M. B. R.
First	Northwest corner Seward
First	Northwest corner Stocking
First	Northwest corner Swintoek place
Firet	Northwest corner Pettibone
First	
First	
Frederick	
Frederick	Northwest corner Crosby
Fourth	North side, opposite North Lane avenue
Fourth	North side, opposite North Pine
Fourth	Northwest corner Lincoln
Fremont	Northwest corner Second
Fremont	Northwest corner Third
	West side, opposite Nagold
Fremont	West side, opposite Springfield avenue
Fremont	Northwest corner Walker avenue
	Northwest corner Ninth
Fremont	North side of Eleventh
Hemlock	North side, 380 feet east of Straight
Hogadone avenue	
Hovey	Northwest corner Indiana
Hovey	
Hovey	Northwest corner Gannison
Jackson	
Jackson	
Jackson	Northwest corner South Lane avenue
Jackson	Northwest corner South Pine
Jackson	Northwest corner Marion
Jennette	
Jennette	Northwest corner Tenth
Jennette	Northwest corner Eleventh
•	
	Northwest corner ('hubb
	Northwest corner Olive
Lincoln	Northwest corner First

# WEST SIDE HYDRANTS.—CONTINUED.

STREET.	LOCATION.
Lincoln	· ·
Lincoln	Northwest corner Third
Lincoln	Northwest corner Fourth
Muskegon	
Muskegon	Northwest corner Ninth
Muskegon	Northwest corner Eleventh
Muskegon	Northwest corner Twelfth
McReynolds	Northwest corner Ninth
McReynolds	Northwest corner Eleventh
Ninth	South side, 480 feet west of Broadway
Ninth	North side, 650 feet west of Broadway
Ninth	North side, 150 feet east of Muskegon
North	North side, opposite Davis
North	North side, 200 feet east of Davis
North Pine	
North Pine	
North Front	Northwest corner Crosby
North Front	Northwest corner Myrtle
Quarry	West side, 600 feet south of West Leonard
Quarry	Northwest corner Crosby
Quarry	Northwest corner Myrtle
River avenue	west side, 200 feet north of L. S. & M. S. R. R.
River avenue	West side, opposite West Wealthy avenue
Second	
Second	Northwest corner North Lane avenue
Scribner	West side, at Seventh street extended
Scribner	Northwest corner Ninth street extended
Sibley	Northwest corner Indiana
8ibley	North side, 160 feet west of Tuech's alley
Sibley	Northwest corner South Lane avenue
Sibley	Northwest corner South Pine
Sibley	Northwest corner Marion
Sixth	North side, 580 feet west of Broadway
Sixth	
Sixtn	Northwest corner Muskegon
Sixth	Northwest corner Davis
Sixth	
Sixth	
South Front	West side, at alley north of G. R. & I. R. R.

# WEST SIDE HYDRANTS.—CONTINUED.

WEST SIDE HYDRANTS.—CONTINUED.	
STREET. South Front	LOCATION West side at angle south of G. R. & I. R. R.
South Lane avenue	
South Lane avenue	
South Lane avenue	
Straight	
Straight	•
Summer	
Third	•
Third	
Valley avenue	
Veto	_
Walker avenge	
Walker avenue	
Walker avenue	
Webster	
West	
West	
West	
	•
West	
West Division	•
West Div sion	
West Division	
	-
West Fulton	
West Fulton	
West Leonard	
West Leonard	
	• ••
West Leonard	
• • • • • • • • • • • • • • • • • • • •	
West Leonard	
SUMM	•
East Side	
West Side	156
Total	422

# GATE VALVES PUT IN SINCE APRIL 30, 1890.

### EAST SIDE.

STREET	LOCATION	Size
Ann	East line Canal	4
Ann	West line Plainfield avenue	4
В	West line Grandville avenue	8
В	East line Godfrey avenue	8
Bates	East line South Union	4
Bates	West line South East	4
Benson	South line East Bridge	4
Benson	North line East Bridge	4
Bostwick	South line Fountain	4
Bradburn	North line Fifth avenue	4
Buckeye	East line South East	4
Buckeye	East line Hollister	4
Buckeye	West line South Diamond	4
Canal	North line Trowbridge	8
('anal	Near Ottawa street main	80
Canal	North line Sweet	8
Canal	North line Palmer avenue	8
Cass avenue	South line Hall	6
Cedar	West line North College avenue	12
Charles	North line Thomas	4
Cherry	West line South Diamond	8
Coit avenue	South line Bradford	6
Cody place	South line First avenue	4
Coldbrook	East side Ottawa street main	20
Coldbrook	On drain into sewer	6
Crawford	West line Madison avenue	4
Dale	East line ('anal	4
Diamond	North line Lake avenue	6

STREET	LOCATION	Size
Diamond	South line East Fulton	6
Diamond	North line East Fulton	6
Dunham	East line South East	4
Dwight	North line Lake avenue	4
East Fulton	West line South East	10
East Fulton	East line Diamond	10
East Fulton	West line Fuller	10
East Fulton	West line College avenue	6
East Leonard	West line North Lafayette	6
East Leonard	West line North College avenue	6
Ethel avenue	South line Wealthy avenue	6
Eureka avenue	North line Wealthy avenue	4
Euclid avenue	South line Hall	4
Fair	East line South Division	4
First avenue	West line Jefferson avenue	4
Fifth avenue	West line South College avenue	8
Fifth avenue	East line South Union	12
Fifth avenue	West line South Division	12
Fourth avenue	East line Grandville avenue	4
Fourth avenue	West line Grandville avenue	4
Fourth avenue	East line Oakland avenue	4
Fountain	East line Grand avenue	6
Frank	Canal, near main	4
Forrest	South line Page	4
Grand avenue	North line East Fulton	4
Frand avenue	South line Fountain	4
rand avenue	North line East Bridge	4
Frandville avenue	South line Bartlett	12
Frandville avenue	South line Wealthy avenue	12
Grandville avenue	South line Second avenue	12
Frandville avenue	North line Fifth avenue	12
Frandville avenue	South line Fifth avenue	12
	North line Bekius court	12
randville avenne	North line Hall.	12
Frandville avenue	South line Hall	8
lilbert	West line Madison avenue	6

# OF THE CITY OF GRAND RAPIDS, MICH.

STREET	LOCATION	Size
Griggs avenue	West line South Division	6
Grigge avenue	East line Buchanan	6
Green	East line South Division	4
Green	West line Jefferson avenue	4
Godfrey avenue	North line B	8
Godfrey avenue	South line Fifth avenue	8
Godfrey avenue	North line Fifth avenue	8
Godfrey avenue	North line Chestnut	8
Hall	East line Grandville avenue	. 8
Hall	West line Hilton	8
Hall	West line Buchanan	8
Hall	West line South Division	8
Hall	East line South Division	8
Hall	East line Jefferson avenue north	8
Hall	West line Madison avenue	8
Hall	East line Madison avenue	4
Hall	West line South East	6
Hall	East line South East	16
Hastings	East line Clancy	4
Hastings	East line North Lafayette	4
Hastings	West line North College avenue	4
Henry	North line Fifth avenue	6
Henrietta	North line Page	4
Highland avenue	East line Cass avenue	4
Highland avenue	West line Madison avenue	4
Highland avenue	East line Madison avenue	4
Home avenue	East line South Division	4
Home avenue	West line South Division	4
Madison avenue	South line Hall	6
Madison avenue	North line Adams	6
Martha	West line Grandville avenue	4
Martha	East line Godfrey avenue	4
Mechanic	East line North Union street	4
North avenue.	North line Madison	6
North East	North line East Fulton.	4
North Coit avenue	North line Sweet	6

STREET	LOCATION	Siza
North Coit avenue	South line Ann	
forth College avenue	North line Bradford	
North College avenue	South line Cedar	
forth College avenue	South line East Leonard	1
North College avenue	North line East Leonard	
North College avenue	South line Fernando	
orth Ionia	North line Mason	;
North Lafayette	South line Bradford	
orth Prospect	North line Hastings	
Oakland avenue	South line Wealthy avenue	
Oakland avenue	North line Chestnut	
Oakland svenue	North line Fifth avenue	
Oakland avenue	North line B	1
Oakdale avenue	East line Madison avenue	
Palmer avenue	Fast line ('anal	
Palmer avenue	East line North Coit avenue	
Salmer avenue	West line Plainfield avenue	
Paris avenue	South line Mills	ĺ
Paris avenue	North line Fifth avenue	Ì
Plainfield avenue	North line Sweet	İ
Plainfield avenue	South line Ann	
Park	East line North Division	
Park	West line Ransom	
Holland	North line East Falton	
Howland	Canal, near main	İ
Hollister	South line Cherry	١
rving place	East line South Lafayette	l
James	North line Sherman	1
Kennedy	East line South Union	
King	West line Grandville avenue.	
La Belle	West line South Division.	1
lake svenne	East line South East	1
Lake avenue	West line Diamond	
Lake avenue	West line Kellogg.	}
Lake avenue.	West line South Fuller.	
Lake avenue.	East line South Fuller.	

# OF THE CITY OF GRAND RAPIDS, MICH.

STREET	LOCATION	Size
ake avenue	At angle Robinson avenue	,
ake avenue	North line Wealthy avenue	(
ake avenue	East line South East	١,
ake avenue	East line South Diamond	,
ake avenue	West line South Fuller	١.
logan · · · · · · · · · · · · · · · · · · ·	East line South East	
ogan	West line South Diamond	
Logan	West line South Fuller	,
ogan	East line South Union	
Jogan	West line Henry	
ogan	West line South East	
Madison avenue	West line Reed	
fadison avenue	South line Fifth avenue	
fadison avenue	South line Eighth avenue	
fadison avenue	Highland avenue between High and Low service	
fadison avenue	North line Hall	
Pleasant	East line South Division	
Pleasant	West line Jefferson avenue	
Pleasant	East line Jefferson avenue	
Pleasant	West line South Lafayette	
Presentt	East line Buchanan	
Prescott	East line Grandville avenue	
rince	West line South East	
Prince	East line South Union	
Prospect place	North line East Bridge	
Reed	North line Madison	
Roed	South line Madison	
Richard terrace	North line Wealthy avenue	! !
Rumsey	East line Grandville avenue	
Salem	South line Hall	
second avenue	East line Oakland avenue	
Sherman	East line South Union	
Sherman	West line South East	
Sherman	East line South East	
outh Division	South line Hall	
outh Division	South line Fair	

## EAST SIDE GATE VALVES.—Continued.

STREET	LOCATION	Size
South Division	In Crofton avenue.	1
South Division	North line Griggs avenue	1
South Division	North line Barton avenue	
South College avenue	South line East Fulton	10
South College avenue	North line	1
South College avenue	North line Wealthy avenue	1
South College avenue	South line Wealthy svenue	1
South College avenue	North line Fifth avenue	1
South East	South line East Fulton	
South East	North line Cherry	
South East	South line Cherry	
South East	North line Wesltny avenue	
South East	South line Wealthy avenue	١ ،
South East	North line Sherman	
South East	South line Sherman	
South East	North line Fifth avenue	
South East	South line Fifth avenue	
South East	South line Alexander avenue	
South Ionia	South line Hall	
South Prospect	North line State	
South Prospect	South line Cherry	
South Prospect	North line Wealthy avenue	
South Spring	North line Cherry	1
South Spring	South line Cherry	
South Spring	North line Wealthy avenue	
South Waterloo	165 feet north of Island	
South Waterloo	North line Cherry	
South Waterloo	North line Wealthy avenue	
South Union	North line Fifth avenue	
Γenth avenue	West line South Division	
Terrace avenue	South line Eigth avenue	
Terrace avenne	North line Hall	
Travis avenue	East line Canal	
Twelfth avenue	West line South Division	
Twelfth avenue	East line Buchanan	
Umatilla	East line Madison avenue	

## EAST SIDE GATE VALVES .- CONTINUED.

STREET	LOCATION	Size
Waverly place	South line State	
Waverly place	North line Cherry	
Washington	East line Jefferson avenue	
Washington	West line South Lafayette	
Wealthy avenue	East line South East	15
Wealthy avenue	West line South Diamond	15
Wealthy avenue	West line South Fuller	15
Wealthy avenue	East line South Fuller	10
Wealthy avenue	West line Carlton avenue	10
Wealthy avenue	East line Ethel avenue	10
Wealthy avenue	West line School	6
Wells	North line Wealthy avenue	4
Wellington place	East line South East	
West Park place	North line East Fulton	4
Williams,	East line Ellsworth	4
Woodlawn avenue	East line Madison avenue	
Worden	West line South East	
Worden	East line South Union	/

	Size
Force main, in pump station	30
Force main, in pump station	20
Force main, in pump station	16
Force main, in pamp station	16
Force main, outside near pump station	30
Force main, outside near pump station	20
Force main, outside near pump station	16
Force main, outside near pump station	16
Blow off, from 16 anch force main into river.	4
Blow off, from 16-inch force main into river	4
Blow off, from 20-inch force main into sewer	6

## WEST SIDE GATE VALVES.

STREET	LOCATION	Size
Alpine avenue	North line Seventh	12
Alpine avenue	North line Eleventh	12
Alpine avenue	South line West Leonard	12
Alpine avenue	North line West Leonard	12
Alpine avenue	South line Myrtle	12
Alabama	North line West Bridge	6
Allen	East line Summer	4
Allen	East line Winter	4
Barkers court	North line West Bridge	4
Beech avenne	South line Fourth	4
Bowery	East line Indiana	4
Bowery	West line Indiana	4
Bowery	East line South Pine	4
Broadway	South line North	10
Butterworth avenue	West line River avenue	8
Butterworth avenue	West line South Lane avenue	8
Butterworth avenue	East line West	8
Cadwell	North line West Bridge	4
Chatham	East line Indiana	4
Chatham	West line Indiana	4
Chatham	East line South Pine	4
Chubb	North line Letellier	•
Court	South line West Bridge	•
Court	North line Shawmut avenue	6
Court	South line Shawmut avenue	6
Croshy	West line Alpine avenue	4
Crosby	East line Tamarack	4
Davie	North line Seventh	4
Davis	South line Eleventh	. 4
Dayton	East line Indiana	4
Dayton	West line Indiana	4
Dayton	East line South Lane avenue	4
Farle	East line Straight	4
Eleventh	West line Broadway	6
Eleventh	East l'ne Muskegon	6
Fifth	East line Stocking	. 4

STREET	LOCATION	Size
First	West line Broadway	   4
First	East line Stocking	4
First	West line Stocking	4
First	East line Fremont	¦ 4
First	West line Fremont	¦ 4
First	East line Lincoln	4
Frederick	North line West Leonard	4
Fremont	North line West Bridge	4
Fremont	South line Fourth	ε
Fremont	South line Seventh	ε
Fremont	North line Walker avenue	e
Gelock alley	South line Butterworth avenue	4
Hemlock	East line Straight	e
Hogadone avenue	South line Butter worth avenue	4
Hovey	East line Indiana	4
Hovey	West line Indiana	4
Indiana	South line West Fulton	12
Indiana	North line Butterworth avenue	12
Jackson	East line Indiana	4
Jackson	West line Indiana	4
Jackson	East line South Pine	4
Jennette	North line Seventh	6
Jennette	North line Eleventh	4
Jennette	South line West Leonard	6
Letellier	West line South Front	6
Lincoln	North line West Bridge	4
Lincoln	South line Second	4
Lincoln	South line Fourth	4
Maple avenue	South line Fourth	4
Mt. Vernon	South line Shawmut avenue	6
Muskegon	North line Seventh	6
Muskegon	North line Eleventh	4
Muskegon	South line West Leonard	6
McReynolds	North line Seventh	4
Nagold	West line Stocking	4

STREET	LOCATION	Size
Ninth	East line Muskegon	
Ninth	West line Alpine avenue	
North	East line Alpine avenue	
North Pine	South line First	
North Front	North line West Leonard	1
North Front	South line Webster	
North Front	20 feet south of south line Webster	İ
Park avenue	East line South Lane avenue	
Pettibone	North line West Bridge	
Pettibone	South line Fourth	
Quarry	North line Eleventh	
Quarry	South line West Leonard	
Quarry	No th line West Leonard	
Quarry	South line Myrtle	ļ
River avenue	South line Butterworth avenue	
Second	West line Stocking	
Second	East line Fremont	1
econd	West line Fremont	
Scribner	   South line Fourth	
Scribner	North line Eleventh	
Scribner	South line Webster	
Shawmut avenue	East line Straight	ļ
Shawmut avenue	West line West Division	l
Sibley	E-s- line Indiana.	
Sibley	West line Indiana	
Sibley	East line South Pine	
Sixth	West line Broadway	
Sixth	East line Stockin.	
South Front	North line West Fulton	
South Laneavenue	North line Butterworth avenue	i
Springfield avenue	East line Fremont	!
Straight	South line Butterworth avenue	1
Penth	West line Alpine avenue	1
Third	West line Stocking.	1
Third	East line Fremont	
Third	West line Fremont	

## WEST SIDE GATE VALVES .- CONTINUED.

STREET	LOCATION	Size
Valley avenue	North line West Bridge	6
Walker avenue	West line Fremont	8
Walker avenue	East line Powers	8
Webster	East line Scribner	8
West	South line West Leonard	4
West	North line West Leonard	4
West Division	North line Shawmut avenue	6
West Division	North line Jackson	6
West Division	South line West Bridge	6
West Fulton	East line South Lane avenue	8
West Fulton	West line West	8
West Leonard	Weet line Alpine avenue	8
West Leonard	East line Tamarack	8
West Leonard	East line West	8
West Leonard	East line Greenwood cemetery	8
Alley between Court and Mt. Vernon.	North line Shawmut avenue	4
Alley between Mt. Vernon and Sum-	North line Shawmut avenue	4

## SUMMARY

East Side	3	4	9	14	6	81	76	102
Total			100				1	

88

Total number of gate valves.....

TOTAL PIPE LAID

DIAMETER OF PIPE IN INCHES	7	9	80	10	12	16	07	88
High service. Low service, East side.	32,454 88,517	80,129 25,899	5,964	5,964 4,902	6,858		6,003	346
Low service, West Side.	46.284	22,820	19,812	772	9,552			:
Total length in feet.	112,585	78,848	44,887	5.674	19,685	6,003	1,697	978
Length in miles reported in 1890 65.93								
Less Wyckoff pipe, removed, for which fron is substituted	is substitu	ted				117.87 3.44		
Total miles of mains		:				114.48		
Number of hydrants					688 888			
Total number of public bydrants		:				1,068		
Number of gate valves					7 SS			



# Twenty-Second Annual Report

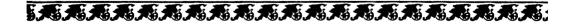
OF THE

# BOARD OF PUBLIC WORKS

TO THE COMMON COUNCIL OF

THE CITY OF GRAND RAPIDS,
MICHIGAN.

THE FISCAL YEAR ENDING APRIL 30, 1895.





# ANNUAL REPORT

OF THE

# BOARD OF PUBLIC WORKS

TO THE COMMON COUNCIL OF

THE CITY OF GRAND RAPIDS,

TRANSMITTING THE REPORTS OF

Secretary, City Engineer, Engineer of Pumping Station, and Inspector of Water Waste.

THE FISCAL YEAR ENDING APRIL 30, 1895.



GHAND RAPIDS, MICH



# BOARD OF PUBLIC WORKS.

FRANCIS LETELLIER, PRESIDENTTerm expires	May,	1896
C. D. STEBBINS, MAYORTerm expires	May,	1896
C. G. SWENSBERG Term expires	May,	1896
L. C. STOWTerm expires	May,	1897
J. J. McVEAN Term expires	May,	1897
DUDLEY E. WATERS Term expires	May,	1898

# OFFICERS.

H. A. COLLAR
GEO. M. AMES Assistant City Engineer
FRED A. TWAMLEY
THOS. J. WILLARD Assistant Collector
E. A. BATES Engineer of Pumping Station
JOHN VAN AMBERGSupt. of Repairs and Construction
A. PER LEE

. • . •

## REPORT OF THE BOARD.

GRAND RAPIDS, MICH., JULY 13, 1895.

To the Honorable the Common Council of the City of Grand Rapids:

GENTLEMEN—Herewith is transmitted the annual reports of the City Engineer, Secretary of the Board of Public Works, Engineer at the Pumping Station and Water Inspector.

These reports give in detail the work done under the supervision of the Board of Public Works for the year ending April 30th, 1895, the following being a summary:

#### STREETS.

Grade lines have been established to the extent of 18.4	1 miles
Grade lines re-established to the extent of 6.8	35 "
Streets improved	139 "
(In connection therewith was constructed 272 catch	basins,
and 75,482 feet lineal curb stone was set).	
The number of miles of improved streets in the city is	150,485
" " unimproved streets in the city is	131,288
-	
Making a total mileage of	281,773

#### SEWERS.

There was built during the year 4,111 miles of sewers. The total length of sewers in the city is 91,442 miles.

#### WATER MAINS AND HYDRANTS.

There was 3,638 feet of water mains laid and 10 fire hydrants were placed.

The total length of water mains in the city now is 115.04 miles and there are 1068 fire hydrants in use.

The cost of the various improvements made during the year
and payments on work now under construction, was:
For streets finished
Sewers constructed
Bridge work
Engine house work
Water mains laid
Unfinished work under contract
<del></del>
Total\$295,037.62
Total\$295,037.62  The Board of Public Works was organized in 1873, since,
The Board of Public Works was organized in 1873, since,
The Board of Public Works was organized in 1873, since, there has been expended under its direction:
The Board of Public Works was organized in 1873, since, there has been expended under its direction:  For water works
The Board of Public Works was organized in 1873, since, there has been expended under its direction:  For water works

Making a total of......\$4,704,628.52

17,805.67

## WATER WORKS.

Bridges.... 180,387.04

### RECEIPTS.

F	or the year ending April 30th, 1895, were:	
From	water rates	\$75,185.40
"	water permits	1,955.00
"	miscellaneous	1,310.25
	Total	\$78.450.65

#### EXPENDITURES.

For pumping	\$30,750.93
" office and collecting	2,361.30
" repairs and inspection	10,855.97
Total cost of maintenance and operation	\$43,968.20
Excess of receipts over expenditures \$33,172.24.	

The water works does not receive any income from, or credit for, water supplied to fire hydrants, public fountains, for its use in parks or city cemeteries, nor for that used in the flushing of sewers or washing of streets. A reasonable allowance for such purposes alone would more than pay the interest on bonded indebtedness of the works.

The entire cost of the water works to date is\$1	1,201,966.29
Bonded indebtedness for water works is	887,000.00
Annual interest on water works bonds is	41,685.00

The number of services now in use are 6,393, supplying 21,-752 fixtures.

The average daily consumption of water for	
the year just closed was10,321,802 gallons	5.
Last year 8,833,546 "	
Being an increase of nearly 17%.	

To meet the continually increasing consumption of water, the board is now erecting a fifteen million Triple Expansion, High Duty Nordberg Pumping Engine, which when installed, together with the Gaskill Pumping Engine, now transferred to the hill service, will be able to furnish a daily supply of 23 million gallons; a quantity anticipating the city's demands for a number of years to come, leaving what is known as the Butterworth Pumps (combined capacity 10 million gallons) as a reserve.

To economically distribute the quantity now used, it is necessary that an additional force main be placed on the hill service, remote sections of which are now poorly supplied, as well as to increase the standpipe to give additional pressure on that service, and that at least one large main be laid now to that section of the low service where the supply is inadequate. These required expenditures to a great extent are necessary to supply the territory that was added to the city in 1891.

In addition to the erection of the pumping engine, and the changes thereby made a necessity, at the pumping station, the principal work now being done is the construction of a sanitary sewer in what is known as the Coldbrook Valley District, and when completed will furnish drainage to one of the most rapidly growing portions of the city.

Respectfully submitted,

Francis Letellier,
C. G. Swensberg,
L. C. Stow,
J. J. McVean,
Dudley E. Waters.

Board of Public Works.

# SECRETARY'S REPORT.

Office Board of Public Works, CRAND RAPIDS, MICH., MAY 1, 1895.

# To the Honorable Board of Public Works: GENTLEMEN—I respectfully submit to your honorable body the following report for the year ending April 30, 1895. The number of services connected with the city's works on the 1st of May, 1894, for which permits were issued..... 6451 Number of services put in the past year, for all of which permits were issued ...... ..... ..... 805 7256 Number of special connections existing May 1, 1895...... 65 Total number of connections existing May 1, 1895.... 7321 Number of services now cut off...... 928 Number of services now open..... 6393 The receipts of the year have been as follows: From water rates..... \$ 75,185 40 From water permits..... 1,955 00 Total income from water works.....\$ 77,140 40 Miscellaneous receipts..... 1.310 25 Total for the year.....\$ 78,450 65 Cash on hand May 1, 1894..... 1,656 69 Total.....\$ 80,107 29

Deposits have been made with the City Treasurer during year as follows:	
To the credit of the water works income fund\$78,548	91
To the cross of the general families of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control	00
To the credit of first and second district sewer funds 150	00
To the credit of the bridge fund	<b>34</b>
To the credit of the road roller fund	42
Total deposits during the year	67
Cash on hand to balance	
Total\$80,107	29
Receipts from May 1, 1874, the commencement of collectio to May 1, 1894.	ns,
From water rates, fines, etc\$594,600	<b>42</b>
From water permits 21,212	
From various sources (per past reports) 30,975	36
Total\$646,788	26
Receipts for the past year	65
Total receipts to date\$725,238	91
Deposits from May, 1874, to May, 1894:	
To the credit of the water works income fund 619,796	05
To the credit of various funds (per past reports) 25,335	57
Total\$645,131	<b>62</b>
Deposits made the past year	67
Cash on hand to balance	
Total\$725,238	91

# STATEMENT OF EXPENDITURES.

May 1, 1894, to May 1, 1895.

# CONSTRUCTION OF WATER WORKS.

# 1—PIPE SYSTEM.

Extension of mains\$ 2,230 70			
Pipe connections at pumping station 3,972 95			
	\$	6,203	65
2—Pumping Machinery.			
New machinery, etc	\$	293	<b>3</b> 0
3—Buildings and Grounds.			
Filling grounds 30 25			
Electric light engine and foundation 459 50	Φ.	400	<b>~</b> ~
· · · · · · · · · · · · · · · · · · ·	Þ	489	10
4—Intake.			
Dam at intake	\$	832	70
5—Water Supply.			
Water examination	\$	195	00

## 6-METERS.

New meters	\$	212	75
Total Paid previous to May 1, 1894		•	
The total bonded indebtedness for water works is		201,966 887,000	
MAINTENANCE AND OPERATION OF WAT	ER '	WORKS.	
1—Pumping.			
Salary of engineer  Salary three assistant engineers  Salary five firemen, one wiper, one coal passer, or oiler  Fuel  Repairs to pumping machinery, boilers, etc.  Repairs to pumping station	ne 	2,800 4,140 19,708 779	00 00 92
Supplies Telephone rent Street car tickets	•	1,403 56	50
	-	\$30,750	93
2—Office and Collecting.			
One-fourth salary clerk and collector.  Salary assistant collector.  Salary second assistant.  One-half salary third assistant.  Books, stationery, and printing.  Stamps and postals.  Incidentals.		375 840 540 210 164 208 24	00 00 00 22 00

\$2,361 30

# 3-Repairs and Inspection.

Calamark amendment of management and according	<b>.</b>	
Salary of superintendent of repairs and construction	\$ 1,500	00
Salary of inspector of water waste	1,050	00
Salary of inspector of plumbing	340	12
Iron pipe mains	1,031	46
Filter and intake	1	<b>75</b>
Settling basin	118	69
Hydrants	1,194	24
Sprinkling hydrants	59	25
Valves	<b>282</b>	<b>85</b>
Meters	831	91
Services	2,918	<b>82</b>
Tools and supplies	<b>682</b>	<b>04</b>
Barn and horses	675	06
Shop and storehouse	24	<b>75</b>
Telephone at superintendent's residence	40	00
Street car tickets	105	00
	\$10,855	97

# RECAPITULATION.

Pumping Office and collecting	\$ 30,750 2,361	
Repairs and inspection	10,855	97
Total paid for maintenance and operation	\$43,968	20
Paid for maintenance previous to May 1, 1894	\$366,650	<b>56</b>
Paid during past year	<b>43</b> ,968	20
Total paid for maintenance and operation to date	\$410,618	76
Income for the year	77,140	<b>4</b> 0
Cost of maintenance and operation	<b>43,96</b> 8	<b>2</b> 0
Excess of receipts over expenditures	33,172	24

Four meters were purchased during the year, making a total of 528 now owned by the city, as follows:

NAMES OF METERS.	Running.	In Shop.	Total.
Worthington	304	40	344
Crown	44	12	56
Ball & Fitts Rotary	25	7	\$2
Ball & Fitts Duplex	32	4	36
Ball & Fitte Piston	0	15	15
Hersey	31	3	34
Nash	5	1 1	6
Thompson	4	1	5
Total	445	83	528

Twenty leaks on water mains have been repaired during the year. Four hundred and ninety permits to connect with the public sewers were issued during the year.

Respectfully submitted,
FRED A. TWAMLEY,
Secretary and Collector.

# ENGINEER OF PUMPING STATION REPORT.

GRAND RAPIDS WATER WORKS
PUMPING STATION,
May 1, 1895.

To the Honorable Board of Public Works:

GENTLEMEN—I have the honor to submit the engineer's report for the year ending April 30, 1895.

The following table shows the number of gallons of water pumped, the amount of coal consumed for pumping, raising steam, heating building and running electric light engine, and the cost of same. The average daily consumption of water for the year has been 10,321,802 gallons, against an average the previous year of 8,833,546 gallons, an increase of 16 8-10 per cent.

Total cost of coal to pump 1,000,000 gallons of water into the high and low systems, \$5.00, against a cost the previous year of \$4.75, an increase of 5 2-10 per cent., caused by the Gordon and Maxwell pump running all summer and an increase in the cost of fuel.

Total number of gallons of water pumped into the stand pipe for the year ending April 30, 1895, has been 1,027,018,981 gallons, while the amount pumped the previous year was 887,839,831 gallons, an increase of 15 6-10 per cent., in the high system.

The daily average consumption of water in the high system for the year ending April 30, 1895, has been 2,813,750 gallons, while the year previous the consumption of water was 2,432,438 gallons.

Respectfully submitted,

E. A. BATES, Engineer of Pumping Station.

fo. of Total Gours Run Per Month	Average No. of Hours Run Per Day	of No. of No. of Hours and Per Day
٠ <del>١</del> ٢	. 83 S	
23 55 2,040,882	8 8	3 28
28 59 2,176,402	28 20	20
23 59 1,483,411	- 58 - 58	20
28 50 1,888,035	28 20	28
28 51 1,318,925	12 23	22
24 00 1,361,319	8 %	8
23 50 1,444,987	22 50	28
28 39 1,315.792	£ 23	28
24 00 1,426,747	27 00	8
24 00 1 160,721	8	8
86 46 18,194,783	98 48	<b>3</b>
23 54 1,516,232	# 83	ᅔ
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# INSPECTOR'S REPORT.

OFFICE BOARD OF PUBLIC WORKS, CRAND RAPIDS, MICH., MAY 1, 1895.

## To the Honorable Board of Public Works:

Gentlemen—I respectfully submit the following report for the year ending April 30, 1895.

Total number of premises supplied with city water (not metered) 7,472.

Total number of fixtures 21,752, as follows:

17
<b>54</b>
06
02
90
10
73
ol-
~ ~
22
22 91
91

During the winter two additional inspectors were put on the work for the purpose of making a complete house to house inspection, which resulted in finding many fixtures of which we had no record, and as a result the work has been profitable to the water department.

The following table shows the number, kind, and location of water fixtures.

WARDS.	Baths.	Closets.	Wash Basins.	Sink Faucets.	Urinals.	Hydrants and Sill Cocks.	Miscellaneous.
First and Twelfth	108	518	115	399	22	922	54
Third, Tenth and Eleventh	801	2743	725	1384	7	3184	386
Second, Fourth and Fifth	361	1478	346	1002	22	1989	150
Sixth and Seventh	151	946	144	380	11	1359	73
Eighth and Ninth	84	435	98	254	5	697	52
Schools and Engine Houses	g	34	78	83	28	569	58
Total	1517	6154	1506	3502	90	8210	778
Grand total							21752

Respectfully submitted,

A. PER LEE,

Inspector.

# CITY ENGINEER'S REPORT.

Office Board of Public Works, ) Grand Rapids, Mich., May 1, 1895.

## To the Honorable Board of Public Works:

Gentlemen—I submit herewith my twelfth annual report of public work done under your direction, for the year ending April 30, 1895:

#### STREETS AND ALLEYS.

Grade lines have been approved and adopted to the extent of 18.41 miles and re-established on streets to the extent of 6.85 miles, as shown by the following tables:

NAME OF STREET	FROM	то	Length in feet.
Allerton avenue	Adams	Hall	1026
Ashland avenue	Madison	Page,	778
Alfred	Cuming avenue	Innes avenue	370
Adams	Kalamazoo	Sylvan avenue	3176
Briggs court	Lyon	South End	353
Baraga avenue	Houseman	N. Diamond	, 594
Barnett	North avenue	N. College avenue	595
Barnett	North Union	L-wis	418
Burke avenue	East Leonard	Harvey	4756
Boston avenue	Kalamazoo avenue	East City Line	2545
Batterworth avenue	South Front	South Lane avenue	3033
Baxter	Henry	South East	592
Capen	North East	Houseman	594

NAME OF STREET	FROM	то	Length in feet.
Carleton	DeBruyn avenue	Hall	440
Cornelius avenue	Boston avenue	Johnston avenue	928
Capital avenue	Adams	Hall	1021
Chester avenue	Boston avenue	Hall	2314
Coldbrook	North East	North Fuller	2565
Court	West Bridge	West Fulton	2568
Dorrie	Cuming avenue	Innes avenue	878
Dyk	Edge Grove avenue	Johnston avenue	264
DeBruyn avenue	Kalamazoo avenue	Sylvan avenue	3457
Ewing	Adams	Kalamazoo avenue	610
Edge Grove avenue	Grove Park avenue	Kalamazoo avenue	376
East Gilbert	Kalazamoo avenue	East end of	451
Fountain Park avenue	Grove Park avenue	Kalamazoo avenue	784
Forest avenue	Emerald avenue	Yuba avenue	373
Fifth	North Front	Stocking	8205
Grand avenue	Fountain	Lyon	918
Grove Park avenue	Burton avenue	Orville	1958
Gold	West Bridge	West Fulton	2578
Gunnison	Butterworth avenue	L. S. & M. S. R. R.	707
Highland	Houseman	North Fuller	1906
High	Emerald avenue	Yuba avanue	372
Hooker avenue	South East	Норе	916
Higbee avenue	Adams	Hall	1028
Harrison	East Leonard	Hubert	599
Hubert	North avenue	Lewis	1784
Нагуеу	North East	Houseman	608
Harvey	North Diamond	North Fuller	2568
Ives avenue	But'erworth avenue	Park avenue	720
John	West Bridge	Oswego	567
Johnston avenue	Grove Park avenue	Kalamazoo avenue	583
Jefferson	Chatham	West Fulton	1918
Jefferson	West Fulton.	Butterworth avenue	1129
Leona avenue	Adams	Hall.	1020
Lewis	East Leonard	South End.	959
Morse	North East	North Fuller	2560
Ohio avenue	Adams	Humbolt	1479
Orville	Grove Park avenue	Kalamazoo avenue	1418

<del></del>	1		
NAME OF STREET	FROM	то	Length in feet.
Plainfield avenue	Coldbrook		917
Philadelphia avenue	Adams	Hall	1029
Pelton avenue	DeBruyn avenue	Hall	441
Ramona avenue	Kalamazoo avenue	Vineland avenue	906
Sunnyside avenue	Adams	Boston avenue	1255
Silver Creek avenue	Adams	Boston avenue	1255
Sylvan avenue	Adams	Hall	1032
Short	Burke avenue	Spring avenue	872
Spring avenue	East Leonard	Harvey	4820
Stewart	North East	North Fuller	2562
South Fuller	Adams	Hall	1014
Seventh	Turner	Fremont	8 <b>3</b> 65
Terrace	Houseman	North Fuller	1910
Toren court	Kalamazoo avenue	('arlton	875
Underwood avenue	Adams	Hal)	1019
Valley avenue	Butterworth avenue	West Fulton	2269
Vineland avenue	Adams	Boston avenue	1256
West Broadway	West Bridge	West Fulton	2574
Yuba avenue	lves	East Leonard	3193

# ALLEYS.

BETWEEN	FROM	то	Length in Feet.
Gold and Jefferson	Watson	West Fulton	560
Jefferson and Cass avenues.	Highland	Hall	784
		·	

#### GRADE LINES RE-ESTABLISHED.

NAME OF STREET	FROM	то	Length in feet.
North Diamond		East Leonard	5209
Houseman	East Bridge	Ives	1758
Emerald	Ives	East Leonard	3390
South Fuller		Hall	2250
Croeby	. Fredrick	West End	655
Sinclair	. Hastings	North End	501
Sinclair	Bradford	D., G. H. & M. R. R	1070
Alexander avenue	South East	Bemis avenue	3211
Oakhill avenue	South East	Kalamazoo avenue	970
Watkins	South East	South Fuller	2560
Prince	South East	South Fuller	2560
Worden	. Winsor Place	South Fuller	2330
Winsor Place	. Fifth avenue	Prince	598
Kalamazoo avenue	. Fifth avenue	Fisk	2085
Winsor avenue	Fifth avenue	South of Alexander avenue	1400
Neland avenue	. Fifth avene	Alexander	1255
Carlton	Fifth avenue	Fiek	1918
Howard	Madison avenue	South Union	1250
Nelson	Alexander	Hall	1256

Streets to the extent of 14,439 miles have been improved during the year. In connection with this work 272 catch basins have been constructed and 75,482 lineal feet of curbstone set.

This work has comprised the re-improvement of several streets.

The total cost of such work has been \$251,674.00.

The following tables show the location of streets improved, the character and length of the various improvements.

1 54 F. C. & L. C. Schneider.

1,939 00

180 00

1,750 00

1,364

627

Richard Terrace... Lake avenue .... Wealthy avenue...

GRADED AND PAVED WITH ASPHALT SHEET PAVEMENT.

			Length	Length	N'mber		COST	ST.		
STREET	FROM	10	Street in Feet	Street Stone Catch in Feet Curb Basins	Catch Basips	Contract Estimated Price dentals	Estimated Inci- dentals	Total Cost Front Foot	Cost per Front Foot	NAME of CONTRACT'RS
Parie avenue	Wealthy avenue	Mills	1,463	2,895	•	\$13,700 00 \$130 00 \$13,830 00	\$130 00	\$13,830 00	<b>8</b>	Warren-Scharf As. Pv. Co.
North Ionia		Monroe Pearl	589	old re-set	-	8,252 67	197 83	8,450 00	8 88	8 98 Warren Scharf As. Pv. Co.
	99	GRADED AND PAVED WITH BRICK ON A CONCRETE FOUNDATION	TIM CI	H BRIC	K ON A	CONCRE	TE FOUR	IDATION.		
*South Front	Shawmut avenue. Allen	Allen	533	970	•	5,945 00	155 00	6,100 00	6 81	Mathewson & Kloote.
*Shawingt avenue.	South Front	West Division	1,466	2,687	ν.	13,175 00	275 00	13,450 00	6 14	Mathewson & Kloote.
*East Fulton		Division Jefferson avenue.	921	old re-set		8,490 00	211 00	8,701 00	6 14	6 14 Coleman & Hallwood.
South Ionia	Oakes	Wealthy avenue	1.739	8,879	13	15,000 00	00 00‡	15,400 00	¥ 2	J. McDermott.
	GRAD	GRADED AND PAVED WITH CEDAR BLOCKS ON CONCRETE FOUNDATION	итн с	EDAR E	LOCKS	ON CON	CRETE FO	OUNDATE	ON.	
Fountain	1	North Lafayette North Union	1,918	3,978	=	11,351 00	249 00	249 00 11.600 00	8 25	3 25 L. Schneider.
•Cherry	South East	Kellogg avenue	1,839	3,461	=	10,980 00	383 00	11,363 00	3 70	3 70 Mathewson & Kloote.
	GRA	GRADED AND PAVED WITH TAR CONCRETE ON GRAVEL FOUNDATION	WITH	TAR CO	NCRET	E ON GR.	AVEL FOU	UNDATIO	7	

* Cost to abutting property reduced by smount assessed to Str et Railway Company.

GRADED AND PAYED WITH MACADAM PAVEMENT.

	it per	\$2 98 G. R. Macadam Paving & Supply Co.		1 87 J. Powers.	1 06 J. J. Kens.	1 58 E. A. Copn 11y.	1 11 Vanderveen & Pop.	1 95 A. & P. Vetting.	1 21 Wm. Maynard.	1 41 J. McDermott.	1 86 A. Prange.	0 77 Hoedemans & Ulberg.	1 30 Peterson & Skeels.	0 85 Hoedemans & Ulberg.	191 Higgins & Lehmen.	1 06 P. Marema.	1 24   Miller & Hoffert.	1 58 Mathewson & Kloote.
L	Total Cost Front Foot		STONES.	8,850 00	2,000 00	1,200 00	1,310 00	17,100 00	3.070 00	3,350 00	5,620 00	1,850 00	10,700 00	1,790 00	9,800 00	2,630 00	00 01912	5,240 00
COST	Estimated Inci- dentals	\$300 00 \$13,800 00	н соввсе	200 00	200 00	106 00	121 00	434 (10	198 02	250 00	820 00	208 30	200	157 00	138 20	186 56	1,000 00	265 60
	Contract	\$13.500 (X)	VED WITH	2,550 00	1.800 00	1,094 00	1,189 00	16,668 00	2.876 98	3,100 00	5,800 00	1,141 70	10,200 00	1,633 00	9,361 80	2,448 44	4,640 00	4.975 0.)
N'mber	or Catch Basins	50	ERS PA	22	-	:	99	16	:	. <b>–</b>	2	4	7	9	12	•	-	•
	Stone	\$50 23	GUTT		1,875		1,258	9,087	:	2,591	3,505		698,0	- <del>-</del> :	:	2,519	:	8,823
Length	Street in Feet	2,576	ED AND	1,247	285	<b>4</b> 25	391	4,750	1,827	1,254	1,750	870	<b>4.668</b>	1,183	2,705	1,230	2,645	1,850
	1.0	Hall.	GRADED, GRAVELED AND GUTTERS PAVED WITH COBBLE STONES.	('edar	Southward	L. S. & M. S R. R.	Thomas	Northeast exterd.	Wood Cemetery.	North Dismond	Fountain	Southward	Kalamazoo ave	Walker avenue	West City Line	South Division	Seventh St ext'd.	Гяке нуеппе
	FROM	Fifth avenue	5	Bradford	West Bridge	West Wealthy ave.	Fifth avenue	Plainfield avenue.	West	North East	East Bridge	West Leonard	Madison avenue	Eleventh avenue.	West ride ditch	Buchanan	West Leobard	Fountain
	STREET	Jefferson svenue.		tNorth Prospect	Prospect avenue.	Straight	Bradbarn	East Leonard	West Leonard	Innes avenue	Houseman	Elizabeth	Oakdale ave	Fremont	Fourth	Griggs avenu	†Lincoln	Diamond

(Cost increased by change of grade after work commenced and for additinal drainage.

GRADED, GRAVELED AND GUTTERS PAVED WITH COBBLE STONES.

-			-5	Length	N'mber		COST	Ts		
STREET	FROM	TO	Street in Feet	Stone Curb	Stone Catch	Contract Price	Estimated   Inci-	Total Cost Front Foot	Cost per Front Foot	NAME of CONTRACT'RS
Ethel avenue	Wealthy avenue. Logan.	Logan	8	1,815		\$1,184 00	\$186 00	\$1,320 00	1 10	1 10 Vanderveen & Pop.
Ethel avenue	Logan	Sherman	610	1,555	1,555	1,368 00	132 (0)	1,500 00	1 29	Vanderveen & Pop.
Gilbert	Madison avenue	Madison avenue Valley City C'mt'y	8875	1,98	-	1,643 00	127 00	1,770 00	08 0	0 90 P. Marema
Broadway	North	D., G. H. & M. Ry.	1,606			6,199 00	301 00	6,500 00	2 15	G. A. Christ.
Third	Lincoln	Valley avenue	878	:	*	1,191 00	149 00	1,840 00	88 0	L. Schneider.
Langdon	Fountain	Lyon	785	1,606	••	2,391 00	189 00	2,580 00	1 85	Wm. Maynard.
Valley avenue	West Bridge	West Fulton	2,383	4,752		2,940 00	240 00	6,180 00	3.50	J. Powers.
Chabb	Esrl	Letellier	2837		4	1,200 00	100 00	1,300 00	1 88	1 93 J. MoDermott.
Olive	Earle	Letellier	337	•	7	1,500 00	100 00	1,600 00	2 34	J. McDermott.
South Ionia.	Hall	Stетерв	1,092	2,150	30	2,640 00	160 00	2,800 00	1 45	M. Hogendyk.
Elizabeth	North	Broadway	1,201	:	1	2,444 00	156 00	2,600 00	88	1 08 Peterson & Randall.
South College ave.	South College ave. Mills	Thomas	988	<del>2</del>	•	924 00	108 00	1,090 00	1 85	1 35 G. J. Prange.
North Coit avenue.	North Coit avenue. Sweet Dean	Dean	1,651	3,460	5	4,990 00	180 00	5,170 00	78	1 84 J. J. Rens.

GRADING AND GRAVELING.

			Length	N'mber		S	ST.		
STREET	FROM	TO	Street in Feet	Catch Basins	Contract	Estimated Inci- dentals	Street Cach Contract Estimated Total Cost Pront Foot	Cost per Front Foot	NAME OF CONTRACTORS.
West Leonard	ম	cemetery West city line	1.277	1	* 1,925 00	\$105 00	\$ 2,030 00	<b>8</b> 79	1.277 \$ 1,825 00 \$105 00 \$ 2,030 00 \$ 79 J. McDermott.
Park ave	Park ave South Lane avenue. John Ball park	John Ball park	2,615		11 4,275 00		245 00 4,620 00		94 Wm. Powers.
South Lane avenue.	South Lane avenue Butterworth , ave West Fulton	West Fulton	1.820	80	4,770 00	230 00	2,000 00	1 57	1 57 J. Powers.
Shawmut ave	Shawmut ave Indiana street Valley avenue	Valley avenue	2,584	84	10,000 00	800 00	10,300 00	1 85	1 85 J. McDermott.
West Fulton	West Fulton West Side Ditch John Ball park	John Ball park	1,310	œ	2,673 00	197 00	197 00 2,870 00	1 13	Mustie & Rens.
Batterworth ave	Butterworthave   South Lane avenue.   West city line	West city line	4,467	75	10,997 41	502 59	502 59 11,500 00	1 87	M. Tennis.
			REC	REGRAVELING.	ING.				
Allen	Allen Bouth Front Winter 1.078	Winter	1.078		00 266	8 98	98 00 1,090 00	1 43	1 42   Hoedemans & Ulberg.

The following table gives length in miles of the various kinds of improvements and the total mileage of streets in the city.

Graded and paved with asphalt	2.353
Graded and paved with brick on concrete	2.089
Graded and macadamized	0.836
Graded and paved with tar concrete	0.095
Graded and paved with cedar blocks on concrete	3.296
Graded and paved with cedar blocks on plank	0.528
Graded and paved with cedar blocks on gravel	4.707
Graded and paved with cedar blocks and cobble stone	3.287
Graded and paved with cobble stone on gravel	0.824
Graded, graveled and gutters paved with stone	93.406
Graded and graveled	<b>32</b> .609
Graded	6.465
Unimproved	131.288
Total	281.773

### SEWERS.

The table following gives the location, kind and cost of sewers constructed during the year:

43 catch basins and 55 manholes comprised a part of such work.

The total number of catch basins and manholes in the city, of which we have record, is 2,041 and 1,509 respectively. There are many more which were constructed prior to the existence of the Board of Public Works, under contract, but of which no record has been kept.

The cost of sewer work for the year is \$12,110.00.

TABLE OF SEWERS, GIVING LOCATION, MATERIAL, SIZE, LENGTH AND COST.

	CONTRACTOR.	00 J. J. Rene.	00 A. Bouterse.	00 J. Verberg.	00 Mustie & Rens.	00 Mustie & Rens.	00 J. J. Bens.			00 J. O'Hara.			00 Wm. Powers.		750 00   J. Van Dusen.	_
	Total	* 1,660 00	700 00	900 00	00 008	900 009	1,950 00	\$	1,500 00	780 00	350 00	į	510 00		750	
COST	Esti- mated Incident- als	* 1-5 00	127 54	128 49	156 00	114 00	205 56	3	B <b>≛</b>	103 50	28 28	:	121 30		121 58	
	Contract Price	<b>* 1,475 00</b>	572 46	771 51	244 00	486 00	1,744 44	8	30111	676 50	287 50		888 70		728 42	_
	Ио Свісћ І	-	9	9	<u>:</u>	4	<b>∞</b>	- <b>6</b>	<u> </u>	_ <u>:</u>	_ <u>:</u>	<u>.</u>	89	<u>:</u>	:	
	odanM.oV	- <b>- 9</b>	<b>o</b>	₹	<b>9</b>	_°	80	-		<b></b>		:	~	_	61	67
Length	in Feet	8 622 8 639 8 12	642	1,020	1,656	883	1,964	846 967	998	930	585	3,220 / 600 €	765	121	462	8
	BIZE AND KIND	9 inch glazed pipe 15 inch glazed pipe 18 inch glazed pipe 20 inch glazed pipe	n 9 inch glazed pipe	12 inch glazed pipe	9 inch glazed pipe	. 9 inch glazed pipe	9 inch glazed pipe	9 inch glazed pipe	12 inch glazed pipe	. 15 inch glazed pipe	9 inch glazed pipe	12 inch glazed pipe	9 inch glazed pipe	12 inch glazed pipe	. 12 inch glazed pipe	9 inch glazad nina
	LOCATION OF SEWER	From Lillian ave, to Sherman et	From South Ionia to South Division	From Madison ave. to Paris ave	From Hall to G. R., L. & D. R'y	From Dolbee to South Fast	From Straight to West	From West Bridge to Sibley	From Valley ave. to weet side ditch	From Paris ave to Madison ave	From 125 ft. north of Cherry to	From S. Lane avenue to 649 feet \ ( east of west city limits)	From 50 ft. north of Hall to High-	From Baldwin to Lake avenue	From Packard to South East	North and sunth of Baldwin
	STREET	South Faller	Sixth avenue	Oakdale avenue	Jefferson avenue.	Danham	<b>Dayton</b>	Valley avenue	Јасквоп	Adams	Warren avenue	*Butterworth ave.	Cass avenue	Packard	Baldwin	Month Reat

Eighth avenue { From 100 ft. west Jefferron ave. } 9 inch for the still avenue } From west line Ellaworth avenue } From west line Ellaworth avenue } From west line Enchauan } From Westings } From Westings } From Westings } From Westings } From No. 10 ft. west of Clinton to } 9 inch for the stings }		200	<del>-</del>	- :	<u> </u>			
	a ave. } 9 inch glazed pipe	88	-	- <del></del> -	129 00	61 00	190 00	190 00 Wm. Powers.
From 60 ft. west of Clinton to	venue } 9 inch glazed pipe	277 1	-	 	247 00	78 00		320 00 J. J. Rens.
	on to   9 inch glazed pipe	485	~ .—		276 21	98 79	370 00	370 00 J. Van Dusen.
	ne 9 inch glezed pipe	840 2	~~	* 	474 00	93 93		570 00 Wm. Powers.
Majors Court From Fifth avenue south 9 inch	9 nch glazed pipe	487 2	 		198 00	67 00	280 00	280 00   F. C. Schneider.

†Built in connection with Fourth street improvement. *Built in connection with the street improvement.

In the foregoing tables there is noted sewers to the extent of 4,111 miles.

The mileage of sewers of the several kinds in use is shown in the following table:

Brick	22.290
Glazed Pipe	68.282
Wood Sewers	0.610
Cement Pipe	0.100
Wrought Iron Pipe	0.160
Total miles	91.442

Of which 83.915 miles have been constructed by the Board of Public Works.

The eastern portion of the city (through which passes Coldbrook Creek and the outlet of Reed's Lake), being so situated that it is altogether impracticable to drain into existing sewers, is taken as a separate sewerage district. A system of sanitary and storm water sewers have been devised with a view of lessening the cost of such work below that of a combined system, which in the trunk sewer alone, to provide for the carrying of said creeks, would cost something like 500,000 dollars.

The system adopted and now being executed, when carried out and fully completed will not cost one-fifth that of such trunk-sewer.

The main sanitary sewer, now under contract, extends from Ottawa street at Walbridge street, easterly and southerly through said valley, a distance of nearly four miles to Wealthy avenue, near Giddings avenue. The contract price is 44,890.00 dollars.

When completed, an outlet is provided for nearly  $13\frac{1}{4}$  square miles of territory, a portion of which is quite thickly settled and has long been in need of sewers. The sewer was designed to accommodate a population of over 100,000, which is greater than the present population of the city.

### BRIDGES.

Fulton and Bridge street bridges have been replanked at a cost of \$751.30 for the former and \$680.65 for the latter, making a total of \$1,431.95.

#### ENGINE HOUSES.

Contracts were awarded the Warren-Scharf Asphalt Paving Company for paving the approaches to engine houses Nos. 1 and 3, in the sum of \$360.00 and \$688.40 respectively, or a total of \$1,048.40.

# PARKS.

At the request of the Common Council, water mains were laid in John Ball Park. The work was performed by H. Vanderveen on a contract awarded May 19, 1894. There was laid 1,079 feet of six-inch, 398 feet of four-inch, and 2,536 feet of two-inch pipe, 14 hydrants set and 17 other hose connections provided on the two-inch lines. None of the small pipe lines exceed 300 feet length. The cost of laying was \$867.27, and the cost of the material, not included in the above contract, was \$480.30, making a total cost in this connection of \$1,347.57.

### WATER WORKS.

Consumption of water on the high service system having reached a point quite equal to the capacity of the Smith-Vaile pump and her auxilliary, the Gordon-Maxwell pump, together with the greatly increased consumption on the low service system, has required the purchase of another pump.

To meet the demand on the high service system it was decided to reduce the size of the plungers in the Gaskill pump, now in use on the low service, and connect it up with this system, and procure a larger pump for the low service, retaining for auxilliary service in both systems the so-called Butterworth, or first constructed pumping engines. This change removes the two small pumps first above mentioned.

On December 19, 1894, a contract for constructing a pumping engine of a daily capacity of 15,000,000 U. S. gallons of water was awarded the Nordberg Manufacturing Co., of Milwaukee, Wis., for the sum of \$33,500.

The engine is of the horizontal, triple expansion type, operating three double acting outside-packed plunger pumps.

The pumps are so designed that should it be necessary, one pump can be cut out of service, and the other two pumps kept in operation.

An award for constructing the foundation of the pump was made to said Nordberg Manufacturing Company at the same date of the other award, for the sum of \$1,500. Sub-foundations, which extend to bed-rock, are to be built by the city.

Mains have been laid in the following named	laid in the following	g named streets:
---------------------------------------------	-----------------------	------------------

STREET.	FROM	то	Diameter in inches	Length	Valves	Hydrants
Fourth avenue	Grandville avenue	Oakland avenue	4	690	2	1
Orchard place	Pleasant avenue	Southward	4	300	i	1
Pleasant avenue	North College avenue	Eastward	4	470	1	1
Sinclair	Hastings	Northward	4	319	, 1	1
Oakdale avenue	Madison avenue	Paris avenue	6	997	1	3
Veto	Straight	Indiana	4	334	1	<b></b>
West Leonard	E. line Greenw'd cem'y	Westward	8	528	1	ļ

The cost of the above mentioned extensions and other items of construction reported by the Secretary is \$8,229.15.

The total miles of mains is 115.04 and 1,068 hydrants.

### RECAPITULATION.

Streets\$251,874	00
Sewers	00
Bridges	95
Engine Houses	<b>4</b> 0
Parks 1,347	57
Water Works 8,229	15
Total\$276,041	07
Amount of money paid on unfinished work has been for:	
	4.0
Streets\$ 7,100	19
Sewers 12,096	<b>3</b> 6
Total\$19,196	
	00
Expenses of the office for the year has been:	
Salaries	36
Transportation, repairs, etc	09
Total\$8,115	
	_
Respectfully submitted,	
H. A. Collar,	
Engine	er.

The following tabulated statement-gives the amounts expended under the direction of the Board of Public Works since its organization in 1873:

Table showing the cost of the different kinds, and total cost, the Board of Public Works from the date of its organization, of street improvement and the total cost of all street improvements

FROM	то	Grading.	Grading and Graveling.	Grading, Graveling and Paving Gutters.	Cobble Stone Paving.	Cedar Blocks on Gravel Foundation.	Cedar Blocks on Concrete.
Apr. 1 1878 May 1	May 1 1875 May 1	<b>8</b> 187 80	\$ 48,161 69	\$ 76,768 14			
1875	1876		11,203 62	<b>36,568</b> 0 <b>5</b>		<b>8</b> 2,366 85	
1876	1877		2,610 08	44,453 07		15,240 48	· · · · · · · · · · · · · · · · · · ·
1877	1878	2,810 30	2,457 59	9,795 17	i		
1878	1879	! 		6,753 61	ļ	10,724 24	
1879	1880		404 40	4,181 80		4,492 62	
1880	1881		23,100 35	9,449 59	ļ	1,976 58	· · · · · · · · · · · · · · · · · · ·
1881	1882	2,085 00	5,140 00	59,900 00		12.550 00	·····
1882	1883		10.784 28	39,432 19	\$ 7,752 74	17,830 00	· · · · · · · · · · · · · · · · · · ·
1863	1884		17,160 00	24,639 09	501 08	14,329 73	
1884	1885		5,090 00	33,300 00	<b> </b>	19,750 00	
1885	1886	620 00	16,700 00	18.090 00		8,000 00	·
1886	1887	540 00	9,540 00	72.980 00	į	19,360 00	· · · · · · · · · · · · · · · · · · ·
1887	1888	1,220 00	3,970 00	59,275 00	į	35,120 00	
1888	1889	! :	4,750 00	70,210 00		6,270 00	
1889	1890	2,000 00	1,040 00	83,360 00	2,600 00	 	! 
1890	1891	; ,	14 630 00	37,670 00	ļ. <b></b>	 	 
1891	1892	! .******	2,650 00	124,660 00	600 00	6,920 00	80,216 00
1892	1893	i 	13,790 00	146,286 30	580 00	87,506 40	23,219 30
1893	1894		16.530 00	126,160 00		81,736 72	: 19,500 00
1894	1895		87.410 00	109,640 00	·		22,963 00
	ch kind kinds	 ₹9,412 60	*247,072 01	 \$1,173,551 51	<b>≱12,038 82</b>	*244.178 52	\$145,896 <b>3</b> 0

NOTE.—The above table does not include alley improvements.

of street improvements contracted for and completed each year by April 1, 1873, to May 1, 1895. Also the total cost of each kind for the same period.

Total for each year, and for the whole time	Coal Tar Concrete.	Cedar Blocks on Plank.	Pine Block on Gravel.	Macadam.	Telford Macadam.	Trinidad Sheet Asphalt.	Brick Paving on Concrete.
<b>8</b> 135,215 06	-		8 10,147 98				
57,809 74			7,671 22	·····			
124,085 80			61,731 72	,			
15,063 06							
17,477 85			 				
9,078 82							
84,526 47							
59,675 00							
75,749 21	····				 		
56,629 90	• • • • · • • • • • • • • • • • • • • •				 		
58,140 00	. <b></b>						
43,410 00							
102,400 0	•••••						
99,585 00					 		
81,230 00					l		
89,000 00	· · · · · · · · · · · · · · · · · · ·						
69,000 00		\$ 16,700 00	!				
399,457 47						* 94,493 17	89,918 <b>3</b> 0
274,726 88			!			43,005 88	
212,096 72			İ			•	4.090 00
251.674 00	<b>\$ 1,980 (</b> 0)			<b>≵</b> 13,800 00			43,651 00
\$2,265,979 98	<b>\$1,930 00</b>	*18 <b>,039</b> 00	<b>₹79,5</b> 50 <b>87</b>	\$13,800 00	<b>\$9,000 00</b>	#179 859 05	*137,659 30

Table showing the length of each kind of alley improvement and the total cost for each year since the organization of the Board of Public Works, April 1, 1873, to May 1, 1895. Also the total amount of each kind of improvement and the total cost of all alley improvements during that period, for which contracts were let.

YE	ARS	KIND OF IMPROVEMENT						Total Cost fo Each Year
From	То	Graded	Graded and Graveled	Graded and Paved with Cobble Stone	Paved with Cedar on Gravel	Paved with Cedar on Concrete	Graveled and Gutters Paved	Total Cost from April 1, 1873, to May 1, 1895.
pril 1, 1878 May 1.	May 1, 1875	400	2,186					\$ 3,278
day 1, 1875	1876					· · · · · · · · · · · · · · · · · · ·		
1876	1877	ļ	775					636 8
1877	1878	<b> </b>						
1878	1879	<b> </b>						
1879	1880	<b></b>	 					ļ
1880	1881					<b></b>		ı I
1881	1882	<b> </b>						ļ
1882	1883	500		524	 			1,190
1883	1884	500	275	524				1,930
1884	1885	270	i   ••• · · • • •					23
1885	1886	902	!	. <b></b>	302			550
1886	1887	300	400					350
1887	1888	\\	l 					· · · · · · · · · · · · · · · · · · ·
1588	1889	500	I. <b></b>	524	220	)   <b></b>		1,600
1889	1890					[ 	524	740
1890	1891	524	485	500	 			1,430
1891	1892	1	. <b>62</b> 0	1,110	 	! !		1,900
1892	1893	1	774	3,270				4,480
1898	1894	1	i	'	325	220	484	3,000
1894	1895	· · · · · · · · · · · · · · · · · · ·		·	 	l 		' 
	•	3,896	5,515	6.452	847	220	1,008	\$21,108

Total number of miles of improved alleys, 3,397.

Table giving the length in feet and cost of sewers constructed by the Board of Public Works each year since its organization, April 1, 1873, to May 1, 1895, together with the total length in feet and miles, and the total cost of all sewers constructed by contract.

DATE		LENGTH IN FEET	(Av)om	
From April 1	To May 1	LENGIR IN FEET	COST	
1873	1875	12,196	\$ 5,1·7 14	
1875	1876	12,149	28,192 26	
1876	1877	7,362	20,005 11	
1877	1878	4,353	4,047 64	
1878	1879	2,470	2,589 77	
1879	1880	8,314	11,565 98	
1880	1881	10 793	14,965 41	
1881	1882	13,916	45,855 00	
1882	1588	9.454	9,929 70	
1883	1884	19,601	28.226 31	
1884	1885	31.929	87,376 85	
1885	1886	16,552	15,970 00	
1886	1887	15,075	17.640 00	
1887	1883	16,597	22,463 80	
1888	1889	23 638	38,960 CO	
1889	1890	14 900	10.698 00	
1890	1891	28,180	22,640 00	
1891	1892	33,597	52,540 00	
1892	1893	55.6"0	110,337 60	
1893	1994	84,616	108.932 64	
1894	1895	21,707	12,110 00	
		* 442,071	\$669,593 21	

^{*} Miles, 83.915.

Note—From 1873 to 1875 and in 1894-1895, sewers to the amount of 15,836 feet were constructed in connection with street improvement contracts, the cost of which is included with the cost of street improvements and not in the above table. A few sewers have also been constructed by private parties, the cost of which is not known.

# PUBLIC BUILDINGS.

Public buildings constructed by the Board since its organization and the cost thereof is as follows:

City Hall\$2	245,685	46
Police Headquarters	45,925	<b>75</b>
Engine House No. 6, Grandville avenue	3,019	00
Engine House No. 4, Crescent avenue	4,891	12
Engine House No. 5, East Leonard street	5,741	00
Engine House No. 2, Barclay street	7,250	00
Engine House No. 8, Jefferson street	6,698	72
Engine House No. 3, North Front street	9,990	00
Engine House No. 7, West Leonard street	7,455	70
Engine House No. 9, Madison avenue	7,596	07
Hospital for contagious diseases	3,535	00

^{\$347,787 82} 

## BRIDGES.

Bridges, including foundations, built by the Board since its existence, have cost as follows:

Leonard Street, (covered lattice of wood) not includ-			
ing masonry	\$	10,561	70
Bridge Street, through iron bridge)		37,173	<b>56</b>
Fulton Street, (through iron bridge)		40,859	25
Pearl Street, (through iron bridge)		32,373	67
Sixth Street, (through iron bridge)		27,244	<b>02</b>
Bridge Street over canal (plate girder deck)		8,013	17
Pearl Street over canal (plate girder deck)		9,305	58
Clancy Street over Coldbrook creek (I beams)		1,314	50
Total	- \$1	66,845	45

Repairs, reflooring, painting, etc., of the bridges, done under the direction of the Board, at the request of the Council, amounts to \$14,142.04, or a total expenditure of \$180,387.49.